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IN MEMORIAM: WITMER STONE

BY JAMES A. G. REHN

Plate 10

IN THE eminently fitting words of a long-time colleague, "Witmer Stone was born a naturalist, nurtured a naturalist and a naturalist he lived until the end of his days. Most of the many activities that filled his busy life flowed from his profound interest in nature." Scientist, man of letters, biographer of science and scientists, and protector of wildlife, he combined with these attainments what another old friend, Dr. Cornelius Weygandt, has most aptly called "a genius for friendship." To a buoyant spirit he added an enthusiasm which he kept through life, a keen sense of humor, a touch of whimsey, a sympathetic understanding, a love of good literature and the instincts of the historian and bibliophile, attributes all of which broadened his outlook upon the world and drew him closely to his fellow men. In his death on May 23, 1939, the American Ornithologists' Union lost an honored Fellow and a former President and Editor, and his associates at the Academy of Natural Sciences were deprived of a counselor and coadjutor who for over fifty years had lived as one of them.

Witmer Stone was born in Philadelphia, September 22, 1866, the second son of Frederick D. and Anne E. Witmer Stone. His ancestry was Pennsylvania English-Quaker and Pennsylvania Dutch, two stocks which have given us a number of our famous American naturalists, such as Melsheimer, Haldeman, Say, von Schweinitz, Darlington, Cassin, Leidy and Cope. His father was for many years Librarian of the Historical Society of Pennsylvania and a recognized authority on Pennsylvania history. Doubtless we can trace much of Witmer Stone's appreciation of good literature, scholarly writing and regard for books and book-making to an early paternal influence. When quite young his interest in Nature began to assert itself, and the collecting

of minerals, birds' eggs and skins, insects and plants was the pattern by which it became evident.

By the rare good fortune which some of us have, a group of neighboring youths of the Brown family had similar interests, and from this early association developed friendships severed only by death. In his memorial of Stewardson Brown, Dr. Stone has pleasingly pictured in the following words the influence of 'Restalrig', the Brown homestead, and its folk, upon the lives of the boys who shared it:

"It lay on the extreme eastern edge of Germantown (part of Philadelphia) and beyond it stretched miles of open country, with delightful bits of woodland here and there, and the Wingohocking Creek, then a clear open stream, flowed not far away. The surroundings were ideal for the development of a love of natural history; and the atmosphere of the home equally so. There was a general interest in out-door life in the family, and a love of hunting and fishing on the part of the father and elder brothers. A gun closet in the hall was ever ready to furnish the means of securing any rare bird that visited the neighborhood, while many mounted specimens graced the bookcase in the parlor. And there life was not bound about by narrow restrictions such as some parents feel it necessary to impose. . . . We three boys had very many interests in common—a love of Nature, of music and of out-door athletic exercises—and we became inseparable companions. Indeed for a period of more than ten years we spent almost our entire spare time at Restalrig or in the immediate vicinity mainly in collecting and studying specimens of plants, animals and minerals . . . In 1882, in conjunction with my late brother Frederick D. Stone, Jr., and Brown's younger brothers, Herbert and Francis H., we formed the 'Wilson Natural Science Association', which met in our house where a room had been transformed into a museum for the housing of our collections, and here weekly sessions were held and papers read with all the formality of a more serious organization. While our activities were admittedly very local in scope, I have since been impressed with the admirable basis that they afforded for our future work, better, I am inclined to think, than would have been derived from less concentrated work over a wider field. Our aim was to become familiar with all of the animal and plant life of that part of Germantown as well as the minerals and rocks, and I think we nearly succeeded."

The productive value of this common early interest is evident from the subsequent careers of the two Brown boys most intimately concerned. Amos P. Brown eventually became Professor of Geology at the University of Pennsylvania and Stewardson Brown for years prior to his death in 1921 was Curator of Botany at the Academy of Natural

Sciences of Philadelphia. Its importance to Witmer Stone was often expressed by him, and doubtless much of his exceptionally broad acquaintance with specific elements of the fauna and flora of eastern Pennsylvania could be traced to the boyhood years at Germantown.

Witmer Stone's early education was secured at the historic Germantown Academy, from which he passed to the University of Pennsylvania, graduating in 1887. In undergraduate days he was elected Secretary of his class—one which produced an exceptional number of able and outstanding men—and this post he held until his death. The A.B. degree of 1887 was followed by that of A.M. in 1891, and in 1913 the University of Pennsylvania conferred on him the honorary one of Sc.D., while in 1937 it further honored him with its Alumni Award of Merit.

In March 1888, Stone's appointment as a Jessup Fund Student at the Academy of Natural Sciences of Philadelphia was the beginning of the most important and continuous association of his life, one rich in concrete results for the institution and opportunities for the man. At the beginning of his services at the Academy, interest there in ornithology was definitely quiescent. After the passing of the Cassin period of American ornithology, which centered chiefly at the Academy, the foci of active investigation in that field in this country were elsewhere—chiefly Washington, New York and Cambridge. Stone found the priceless inheritance of the days of Cassin, the great and representative bird collection, mainly mounted on white T-perch stands, still as it was in the 'forties, 'fifties and 'sixties, its priceless types often unmarked and all crowded in glass display cases, subject to the deteriorating effects of light and dust.

His own words, written in 1909,¹ describe vividly the condition in which he found this collection, considered by Philip Lutley Sclater in 1858 to be the finest one then existing of the birds of the world. "When I became acquainted with the collection in 1888, it had had no attention from an ornithologist since the death of Cassin twenty years before and was practically in the condition in which he left it.

"There were 25,000 specimens, all mounted, for, according to the ideas of the middle of the 19th century, every specimen was supposed to be on exhibition. The ornithologist, who to-day can sit comfortably at his desk with thousands of bird skins in cabinet drawers within arm's reach, can realize the difficulties that attended John Cassin's researches, when tray after tray of mounted specimens had to be carried from the museum to the library and there stood upon tables gath-

¹ In 'Problems of Modernizing an Old Museum', *Proc. Amer. Assoc. of Museums*, 3: 122-123, 1909.

ering dust until their investigation was completed. . . . Data were written on the bottoms of the stands, occasionally with the addition of personal or historical comment. One stand for instance bore the inscription, 'Labelled by John Cassin this 29th of Nov. 1848, 1/4 before 8 o'clock in the evening, Wednesday', another 'Just heard of the downfall of the French Empire. Vive la République'. I found also the handwriting of Townsend, Audubon, Baird and Peale. . . . The amount of crowding that was necessary to get the 25,000 specimens into the exhibition cases can readily be imagined. There were no less than 1500 hawks and eagles, among which were 30 specimens of the sparrow hawk, 38 duck hawks and 18 golden eagles. . . . The prospect of reducing that collection . . . and of transforming the majority of the specimens into study skins, not to speak of the task of procuring tight cases for their accommodation, and the cataloging and labelling incident to the work—all at a time when funds for the purpose were not available—was, to say the least, appalling, and was not accomplished in a single year. The entire history of the collection had to be worked up and all possible types or historical specimens hunted out, for in the old days authors did not clearly mark their type specimens; and not until this had been done was it possible to discard any apparently useless duplicates. Finally the data on the wooden stands had to be carefully transcribed to the labels and the catalogue pages and, in the case of types, the bases of the stands themselves were preserved and numbered."

In this laborious work, very largely done with his own hands, Stone located over six hundred types of Gould, Cassin, Townsend, Audubon and a score of other authors; he developed the nucleus of a modern housing method in the Academy and saved for posterity many hundreds of exceedingly rare and in some cases extinct species of birds. Not alone to the bird collection was this salvaging work extended, but extensive, important and irreplaceable series in virtually all fields of zoology and palaeontology were saved from further deterioration and preserved for future generations. For the greater part of twenty years the major official activity of Witmer Stone, aside from direct administration, was that of bettering, with limited help and even more restricted funds, the condition of priceless collections and their conservation for students in years to come.

The official minute adopted by the Council of the Academy on October 3, 1939, after the death of Dr. Stone, most accurately summarized the services of the man to the institution in these words: "His life became so merged with that of the Academy that for many years it was difficult to think of them apart. With characteristic energy and

thoroughness, and the help of other workers, the then wasting biological collections were salvaged, renovated and conserved. Many valuable specimens and records were saved and many reforms in labeling, cataloging and storing were established. During most of this period Stone not only bore the heavy curatorial burdens but for several successive administrations he was the chief advisor of the governing officers and council. Poverty greatly hampered the progress of the Academy. Only through the loyalty and enthusiasm of the staff was its place in the scientific world maintained. The personal sacrifices made were little short of heroic and Stone was an acknowledged leader and inspiration to the younger men."

Officially Witmer Stone's connections with the Academy during the more than fifty years of his association, and subsequent to his first appointment as a salaried student, were: Assistant to the Board of Curators in 1892; a member of the Board of Curators in 1908; executive of that body in 1918; by an administrative reorganization in 1925 becoming Director of the Museum, and Emeritus Director in 1928. He was also elected one of the two Vice-Presidents of the Academy in 1927 and held this honored post until his death. He also served continuously as a member of the Council of the Academy from 1908 on. His technical posts, as distinct from his corporate or purely administrative ones, were: Conservator of the Ornithological Section in 1891, Curator of Vertebrates in 1918, Curator of North American Birds in 1934 and Emeritus Curator of Birds in 1938. As a member of important committees, as those on publication and library, he served the Academy for many years, part of that time as Chairman of the Library Committee.

In 1888, when Dr. Stone became associated with the Academy, its bird collections numbered 26,000 specimens. In 1939, at the time of his death, they totalled 143,000. Much of this growth was directly or indirectly due to Witmer Stone, taking place in years when the conservation of the older collections, and administrative and non-ornithological curatorial routine were paramount responsibilities.

Soon after his association with the Academy, Stone made the acquaintance of Spencer Trotter, who in the 'seventies had been a Jessup Student at the Academy, then had turned to medicine and, after his graduation, to the teaching of biology, for many years prior to his death in 1931 holding that chair on the faculty of Swarthmore College. While a splendid general naturalist, Spencer Trotter was fundamentally an ornithologist of the old school, to whom the gun was the bird man's chief source of information. The resulting life-

long friendship of Stone and Trotter¹ exerted its influence upon both men, who mutually possessed a background of inherited scholarship and culture, brilliant minds, clever wit, a love of good literature and graceful writing with the ability to produce the latter.

Through Spencer Trotter, Witmer Stone met William L. Baily, George Spencer Morris and Samuel N. Rhoads, all young and enthusiastic bird men, and these five with Charles A. Voelker and J. Harris Reed in 1890 organized the Delaware Valley Ornithological Club. From that time what has proved to be one of the most active regional ornithological organizations in the United States, had Witmer Stone as its major figure, while his life had as an integral part the activities and progress of the D. V. O. C., as its members call it. Until failing health compelled him to limit his evening activities, for decades Witmer Stone gave to the meetings of the Club the value and pleasure of an association which its members, drawn as they were from the ranks of technical and professional men of all character—bankers, architects, manufacturers, merchants, doctors, teachers and printers—and students at the start of life, valued beyond expression. His broad knowledge, kindly comments, tactful suggestions and discerning advice were always welcomed, and he stood in the Club as the symbol of authoritative ornithology. For nearly fifty years he gave to the discussions at its meetings a breadth, value and appreciation of ornithology, in its broadest aspects, which has seldom been equalled in the popularization of science in America.

It was largely the interest and energy of Witmer Stone which influenced the D. V. O. C. to authorize the preparation by him of 'The Birds of Eastern Pennsylvania and New Jersey', which was issued in 1894 as a publication of the Club. Similarly his initiative was largely instrumental in the founding of the Club's serial 'Cassinia' in 1901, and for many years he served as the official and for others as the unofficial editor of this journal. The title was very properly given in recognition of Philadelphia's great ornithological figure, John Cassin, and most appropriately the first article was a sketch of Cassin's life by Witmer Stone. His interest in bird migration and the permanent recording of the great number of observations of this type made by the extensive Philadelphia group of bird lovers, and a desire for the continuity of this record, were the chief factors which influenced Stone to urge the founding of 'Cassinia', which has remained distinctive in its migrational information.

Witmer Stone became an Associate of the American Ornithologists'

¹ See 'Spencer Trotter, 1860-1931', by Witmer Stone. *Cassinia*, no. 28, pp. 1-8, with portrait, 1932.

Union in 1885, and was elected a Fellow in 1892. The first meeting of the Union attended by him was that of 1889, and it gave opportunity to meet men whose names were familiar to him from their writings—Brewster, J. A. Allen, C. F. Batchelder, Charles B. Cory, Robert Ridgway, Elliott Coues, C. Hart Merriam, D. G. Elliot and numerous others. For Brewster he developed a high personal regard and life-long esteem, sometimes intimated in informal and conversational evaluations of the work and influence of his American ornithological contemporaries. Coues was considered a particularly brilliant figure, sometimes belligerent but learned and well informed, and withal a bibliographer, which latter implied one mentally in tune with Witmer Stone. Merriam's epochal work on life-zones made an early impression upon Stone, as did many of Dr. Allen's masterly studies. The New England school of ornithologists, possessing that intangible something New Englanders have in common with Philadelphians of the old school, always appealed to Witmer Stone. His occasional visits to Cambridge always afforded him very real pleasure in their opportunities again to meet old friends and respected traditions, and see anew familiar surroundings.

During the 'nineties one of the most pressing matters before the A. O. U. was the need for satisfactory and comprehensive protection for North American birds. While the egret and tern situations were the most conspicuous, they were but symptomatic of a problem made up of many angles—plumes and feathers, eggs, game and pointless slaughter. To this campaign Witmer Stone gave the best in him, and in association with William Dutcher he was a potent factor in securing effective legislation in many directions. He had been active in the work of the Pennsylvania Audubon Society, of which he was President for a number of decades, and also that of the National Association of Audubon Societies when it took over the active work of the State bodies and became the central body for bird protection. However, before that time the A. O. U. Committee on Bird Protection was the main national agency, functioning as early as 1885. As far as available records show, Dr. Witmer Stone became a member of this Committee in 1896, when William Dutcher was Chairman. In 1896, Stone became Chairman of the Committee and continued in that post until 1901, when Dutcher again assumed the chairmanship. During his tenure as Chairman, Dr. Stone was severely criticized by certain oölogists for his strictures on excessive egg collecting, and this may have influenced his withdrawal from the Committee in 1901, disliking, as he did, controversy or personalities in discussion. However, in 1903 he was a member of the A. O. U. Committee on Relations with the Millinery

Trade, which correlated its work with that of the Bird Protection Committee. During the years from 1897 to 1903, a considerable part of his time was taken up with an extensive correspondence on protection matters, and many visits were made to legislative centers in support of bird-protection measures. This interest remained active throughout his life, and the indication of the 'Witmer Stone Bird Sanctuary' at Cape May, by the National Association of Audubon Societies, was a graceful appreciation of his years of service to and interest in the cause of bird protection.

The exact date of Witmer Stone's first appointment as a member of the A. O. U. Committee on Nomenclature and Classification I am unable to ascertain, as Dr. Hicks advises me that the unpublished A. O. U. records of the first two decades of the present century are incomplete in many respects, in part probably due to the membership of such committees being appointed and not elected. From the recollections of years of daily association with Dr. Stone, I am sure that this appointment was made prior to 1910, while, as shown beyond, his cooperation in the preparation of the third edition of the 'Check-list of North American Birds', issued that year by that Committee is acknowledged in the preface. He is shown by the records to have been Chairman of the Nomenclature Committee from at least 1919 to 1931 inclusive, when he was succeeded by Dr. Alexander Wetmore.

The services of Witmer Stone as editor of 'The Auk' and in the preparation of various 'Check-lists' are reviewed on a following page, and in addition he was one of the indexers of the eight volumes of the 'Bulletin of the Nuttall Ornithological Club' and volumes 1 to 37 of 'The Auk', having served as a member of the Index Committee which prepared the index of volumes 18 to 37.

Dr. Stone became a member of the Council of the A. O. U. in 1898, and by election (1898-1914) or by virtue of other office (1914-39) served continuously as a member of that body until his death. He was elected a Vice-President of the A. O. U. in 1914, serving in that capacity until 1920, when he became President, retiring in 1923.

On June 19, 1939, the A. O. U. Council, assembled at the 57th Stated Meeting in Berkeley, California, accepted the report of the Brewster Memorial Medal Committee, which "recommended that the 1939 award be made posthumously to Dr. Witmer Stone for the two-volume work on 'The Birds of Old Cape May'." It was especially fitting that this award, bearing the name of one who to him represented outstanding scholarship in ornithology, should have been made to Witmer Stone, even though fate decreed it should be "in memoriam."

It may well be said that Witmer Stone gave the American Orni-

thologists' Union a half-century of service, probably unsurpassed in its varied character by that of any other member.

Of the considerable number of purely ornithological contributions which came from the pen of Witmer Stone, those of greatest fundamental importance as ornithological corner-stones, or of greatest influence upon other students, are probably the 1896 classic on 'The Molting of Birds, with Special Reference to the Plumages of the Smaller Land Birds of Eastern North America', and his last two-volume opus of 'Bird Studies at Old Cape May', which appeared in 1937. The molts and plumages of birds always had been for him an entertaining field of study, and he personally collected much of the material on which his relatively pioneer work of 1896 was based, an investigation which prompted the search for particular plumages or molting conditions. Through all the later years of his life this interest is reflected in critical plumage comments scattered through papers more directly bearing upon other phases of ornithology.

The Cape May volumes had as their inspiration the appreciation long years before of the particular ornithological importance of the Cape May peninsula. This is due to the convergence of migration lines, the intimate mingling of land and water birds and the area's ease of access from Philadelphia, as well as the fact that its southern position brought into our territory some forms of life very rarely seen elsewhere in New Jersey. Early bird and mammal field work there, with his old friend Samuel N. Rhoads, laid the foundation for a liking which increased with the years, and Cape May became Stone's usual summer residence. His steadily growing notes were constantly augmented by those of other observers living there, the accurate recollections of trustworthy old-time residents of an area which had for generations produced many wild-fowlers, and the records of groups of members of the Delaware Valley Ornithological Club, to whom Cape May, in the last decade and a half, became a year-round Mecca.

As impaired health in his last years prevented the freedom of action to which he had been accustomed, Stone then devoted himself very largely to the preparation of these Cape May volumes, giving to them the concentration and devotion which he was unable to give to field study. With an artistry that combines science and history he wove into a whole this delightful account of the past and present bird life of the region, the changes in conditions and dependent bird life which the years have brought, the bird societies of the various closely placed but very different environments, the migrations and seasonal associations of the birds, and followed these with a series of graceful word pictures of the birds themselves, which will remain part of America's

most cherished ornithological literature. As one colleague has fitly said, this work "reflects Stone at his best, both as a naturalist and a writer."

Stone's first serious contribution to ornithology was published in the 1885 'American Naturalist', a note on 'The Turkey Buzzard breeding in Pennsylvania'. Between that year and 1894, he published sixteen contributions on the ornithology of Pennsylvania and New Jersey; his first paper in 'The Auk', issued in 1887, was on the 'Migration of Hawks at Germantown, Pennsylvania', thus evidencing his early interest in that angle of ornithology, supplemented in 1889 in the same journal by another dealing with methods of recording migration, i. e., 'Graphic Representation of Bird Migration'. An 1892 paper early indicated his Cape May interest—'Winter Birds of Cape May, New Jersey'—and others of these earlier studies dealt with the summer birds of Harvey's Lake and the Pocono Mountains of Pennsylvania, and of the pine barrens of New Jersey. Between 1887 and 1910, he published fifty-two ornithological contributions in 'The Auk' and twenty-six others on the same subject in the 'Proceedings' of the Academy, of which certain ones call for special mention. An 1899 study of a collection of birds from the vicinity of Bogotá, Colombia, is, as stated by Dr. Chapman in an historical summary of the ornithological literature of Colombia, the first critical examination of authentic material from that immediate area, for most previous 'Bogotá' records had been based on trade-skins often secured at considerable distances and in very different life areas. The same year saw the publication of Stone's important historical catalogue of types of birds in the Academy collection, supplemented and completed years later in 'The Emu' by the inclusion of the Academy-owned Gould types of Australian birds. An almost completed manuscript, laid aside in his last illness, carried this catalogue to 1939.

The breadth of Stone's interest in correlated angles of investigation is reflected in certain of his contributions published after the turn of the century, such as the 1903 'Racial Variation in Plants and Animals, with Special Reference to the Violets of Philadelphia and Vicinity', and the 1907 'Life Areas of Southern New Jersey'. Critical ornithological revisions dealt with the genus *Anous*, the Old World Rallinae, the genus *Sturnella*, the genus *Psilorhinus* and the genus *Piaya*; the faunistic studies treated of birds from Greenland, Alaska, California, New Mexico, Lower California, Yucatan, southern Mexico, Honduras, Panama, Matto Grosso, Brazil, Kenya, Uganda, Belgian Congo, French Equatorial Africa and Sumatra. In addition to the 'Birds of Eastern Pennsylvania and New Jersey', which has already been mentioned,

Dr. Stone prepared at the request of the New Jersey State Museum, a volume on 'The Birds of New Jersey, their Nests and Eggs', which was issued in 1909, and which contains a full bibliography of New Jersey ornithology up to the date of its preparation.

In 1912, there appeared from Stone's pen a short paper, most stimulative of thought on a subject which constantly recurs not only to ornithologists, but to all zoologists concerned with problems of relationship. This was 'The Phylogenetic Value of Color Characters in Birds', and its author graphically presented the evidence of color similarities in structurally distinct genera of bee-eaters, kingfishers, cuckoos and parrots inhabiting the same areas.

In the years subsequent to 1910, the number of original ornithological contributions Stone was able to produce was necessarily reduced by his increasingly important official curatorial duties, as well as his new post as Editor of 'The Auk'. It is not necessary to discuss for 'Auk' readers the services of Witmer Stone in the latter capacity. The volumes testifying to this twenty-five years of service need no review. He worked increasingly for the diversification of the contents of the numbers and volumes to cover the many overlapping fields of ornithological research and observation. During the years of his editorship we find the number of critical reviews of current literature from his pen running into several thousand, between 1911 and 1920 alone totalling nearly eight hundred, while in addition 'The Auk's' pages include from his pen a very considerable number of obituaries of American and foreign ornithologists who passed away during those years. His reviews of current literature were more than abstracts and his comments constructively useful to author and student alike. His days and evening hours not devoted to official institutional routine duties were absorbed by the mounting responsibilities of the journal, and as other equally conscientious editors have done, he surrendered many opportunities for original work to devote these hours to the often thankless task of an editor. Only when declining strength made such a decision necessary did he ask to be relieved. At the time of his retirement in 1936, Dr. Stone received from the Council of the A. O. U. a resolution of appreciation for "his 25 years of continuous and arduous work in editing 'The Auk' and other publications of the Union."

Dr. Stone's labors in connection with both the third and the fourth editions of the A. O. U. 'Check-list' have already been noted, but it is fitting that attention should be called to the Union's own recognition of these responsibilities. In the preface to the third edition, issued in 1910, it is stated that "the preliminary revision of the geographical

ranges of the species and subspecies was undertaken by Mr. Stone," and again it is emphasized that "the Union owes a lasting debt of gratitude to Mr. Stone and Dr. Merriam." The years between 1924 and 1931 were crowded with seemingly endless duties required by the fourth edition, and it is stated in its preface that the work was largely written by Dr. Stone. We who were his associates know how largely the 'leisure' hours of Witmer Stone during these years were consumed in the 'Check-list' labors, and to the writer at least the production of this important ornithological corner-stone seemed to afford its chief compiler a deeper satisfaction than any similar task.

The history of his particular field of research, and the lives of those who had labored on the same subject, comprised one of Stone's most vivid interests. For many years he had devoted such time as might be available to accumulating information on the history of American ornithology. Many of these investigations developed little-known or forgotten facts in the lives of a number of the leading actors in the pageant of ornithology on our continent. Fortunately for posterity the series of biographical sketches which appeared from Witmer Stone's pen in 'Cassinia' between 1901 and 1937 gives us in more than one case the best word pictures we have of personalities who left their impress upon American ornithology. Thirteen of these biographies were issued, sympathetically treating, among others, the lives of John Cassin, John K. Townsend, Samuel W. Woodhouse, Adolphus L. Heermann, Thomas B. Wilson,—the patron of Cassin,—William Gambel, George A. McCall and Titian Ramsey Peale. The encouragement of Stone induced other members of the Delaware Valley Ornithological Club to add, in the pages of 'Cassinia', similar studies of Charles Lucien Bonaparte, William Bartram, George Ord and Edward Harris, the patron of Audubon. Stone also contributed the biographies of Alexander Wilson and John James Audubon in 'Leading American Men of Science', published in 1910, and numerous other short articles dealing with these men, their personalia or their classic works came from his pen at various times.

In 1923, at the Fiftieth Anniversary of the Nuttall Ornithological Club, Stone was the guest speaker, and his 'Ornithology of Today and Tomorrow' painted graphically the changing tenor of ornithological research. In introducing the speaker, the President of the Nuttall Club referred to Dr. Stone as the successor in Philadelphia of John Cassin, who was considered "perhaps the first American-born ornithologist of real greatness."

Many years of application to problems of zoological nomenclature, perhaps abetted by his membership in the A. O. U. Committee on

Classification and Nomenclature, resulted in his appointment, in the last decade of his life, as one of the few American members of the International Committee on Zoological Nomenclature, a post he still held at the time of his death.

In fields other than ornithology we see reflected the breadth of interest of the man in animate Nature as a whole. Mr. Wharton Huber, in an appreciation of Stone's work as a mammalogist (*Journ. Mammalogy*, 21: 1-4, 1940), lists nineteen mammal contributions from his pen, of which two, i. e., 'American Animals' (published in conjunction with W. E. Cram) issued in 1902, and 'The Mammals of New Jersey', published in 1908 by the New Jersey State Museum, are of particular importance. Many of his field investigations in the eastern United States had mammal objectives as well as bird incentives. In conjunction with S. N. Rhoads he rediscovered the lemming vole in New Jersey, extended the range of the red-backed vole south in the coastal plain to that State, and reported the rediscovery of the rice rat in the same area.

Stone's familiarity with reptiles is evidenced by a number of papers, among them three on these animals in the Academy's 'Proceedings', while one of his early studies dealt with the lycosid spiders occurring in the Philadelphia area. An extensive collection of local arachnids accumulated by him over a number of years, was added to the Academy's series about the turn of the century, and was followed by a similar presentation of his extensive local bird collection, built particularly to furnish evidence for his plumage studies.

In insect life he always maintained a keen interest, and during the later years of his life his residence at Cape May had as a diversion, which physical limitations had not negated, the building-up of a comprehensive collection of the local insect fauna. This series of many thousands of specimens, often of marked scientific interest and as yet but in part studied, passed at his death to the Academy. The capture, mounting and labelling of these insects during his summers provided escape for the ever-active mind and the inherent collector's instinct from increasing physical limitations. One of the most interesting of the New Jersey pine-barrens grasshoppers—*Melanoplus stonei*—attests his keen interest in local entomology, as he helped collect the type series.

Stone's life-long interest in botany inspired a ten-year period of intensive botanical field studies of the New Jersey pine barrens and adjacent areas, and the consequent accumulation of many thousands of botanical specimens, with full data, which today form part of the Academy herbarium. As a result of these investigations, and the cor-

related examination of Philadelphia and other important herbaria, he prepared what will long remain our most authoritative work on the botany of a part of this area—"The Plants of Southern New Jersey with Especial Reference to the Flora of the Pine Barrens and the Geographic Distribution of the Species". Published in 1912 by the New Jersey State Museum, this work of over 800 pages, backed by thousands of previously unpublished records, is considered by competent botanists to be an exceptionally important floristic study. As Dr. Francis W. Pennell, in appraising Witmer Stone's services to botanical science, feelingly writes (*Bartonia*, no. 20: 33-37, 1940), "it stands forth increasingly with time as the most careful geographic study of any comparable part of the flora of eastern North America." In a recent clarification of the systematics of the gentians it was found that the striking New Jersey pine-barrens gentian required a new name. It is eminently fitting that this exquisite species, which Dr. Stone considered "one of the choicest flowers of the region," will now be known as *Gentiana stoneana*.

Of the many honors bestowed upon Witmer Stone in the course of his busy life, the following may be mentioned to supplement those already given: Vice-President and President of the American Society of Mammalogists; President of the Delaware Valley Ornithological Club; Fellow of the American Association for the Advancement of Science; Member of the American Philosophical Society, Franklin Inn and Philobiblon Club; Secretary and Director of the Ludwick Institute; Honorary Member of the Nuttall Ornithological Club, Cooper Ornithological Club, Linnaean Society of New York, Zoological Society of Philadelphia (also serving for some years as a Director); Philadelphia Botanical Club, British Ornithologists' Union, Ornithological Society of France, Ornithological Society of the Netherlands and Hungarian Ornithological Society; Foreign Member of the German Ornithological Society and the Bavarian Ornithological Society. The Otto Hermann Medal of the Hungarian Ornithological Society was conferred upon him in 1931 for his studies of bird migration. The posthumous award of the Brewster Medal has already been mentioned.

To those privileged to know Witmer Stone in the intimacy of daily association, his broad knowledge of and intimate acquaintance with zoological and botanical matters, his experience in intricate problems of nomenclature, and familiarity with the history of American ornithology and scientific exploration were always available. He was ever ready to give of his time and knowledge to help others who might ask assistance, yet possessed to a considerable degree the reticence, some-

times mistaken for diffidence, of one of deficient hearing, an aftermath of juvenile whooping-cough. His dominant traits of kindness and helpfulness were so pronounced that his long-time friend, Dr. Cornelius Weygandt, has most fittingly said,¹ "Such is his human fellowliness and unselfishness that he will spend an hour any time to help you in your little concerns"; and again, "He was brought up in the old classical curriculum, belonging to that tradition of scientists who know the best that is known and thought in the world outside of their specialty."

Stone's opinion was constantly asked by his associates on many matters other than pure science,—literary form and composition, technical editing and printing, book-making, bibliography and museum technique; his constructive criticism was valued and deeply appreciated. Beneath the burden of responsibilities, some self-imposed because of his preference to do much detail work himself rather than to delegate it to others, there was always a lighter side, a merry twinkle of the eye, a touch of delicate whimsey, or a hearty laugh, to show that beneath all the serious thought there was a buoyant spirit, keenly alive to the world about. As Mr. Huber has so graphically said, "This keen sense of humor and a memory that seldom failed, except in the last few years, made his desk a focal point for his fellow-workers. It is an inestimable privilege to have known Witmer Stone."

Dr. Stone married Miss Lillie May Lafferty, August 1, 1904. While childless, it was an ideally happy marriage. Mrs. Stone survived her husband by little more than a year.

In the passing of Witmer Stone, on May 23, 1939, the A. O. U. lost a devoted associate, science a learned disciple, and his fellow-workers a counselor and leader. As has been said of another, "he was one of the great spirits and they are all too few." In all truth, "his works and our memories are a fitting memorial."

Academy of Natural Sciences
Philadelphia, Pennsylvania

¹ 'Philadelphia Folks', by Cornelius Weygandt, 1938 (pages 266 to 269 give a personal appreciation of Witmer Stone).

ANNUAL CYCLE OF THE BLACK-CAPPED CHICKADEE—I

BY EUGENE P. ODUM

INTRODUCTION

A STUDY of the Black-capped Chickadee (*Penthestes atricapillus atricapillus*) during one complete annual cycle was part of the research program of the writer during 1939-40 at the Edmund Niles Huyck Preserve, Rensselaerville, New York. Because of a year-around availability and comparative tameness the chickadee is an excellent subject with which to combine field and laboratory techniques in the study of behavior and ecology. As a control for experimental work with a wild species it is desirable to be familiar with the normal life history. Also, laboratory experimentation is more intelligently carried out after the problems in behavior become clearly outlined through field observation. Despite the fact that the chickadee is a common bird many details of its life history are either not known or poorly recorded. Consequently, a study of the chickadee in Nature has been the first objective, but at the same time experiments in the laboratory were begun with the cardio-vibrometer, an instrument which measures certain physiological rates.

An attempt was made to carry on the field work with equal intensity throughout the year. Between August 28, 1939, and September 6, 1940, observations were made at least weekly and often daily, except during the last two weeks in November and December when the writer was absent from the region. However, the present report is not intended to be a complete life history of the species, but rather the result of a year's study in a restricted locality. For convenience, the annual cycle will be divided into three parts: (1) pair-formation and territory; (2) nesting; (3) flock organization and general behavior. For the most part the laboratory phase of the study will be reserved for another paper.

The writer is indebted to the officers of the Edmund Niles Huyck Preserve and to the Scientific Advisory Committee for opportunity to conduct the work. Frequent encouragements and helpful suggestions by the late Dr. G. Kingsley Noble were of inestimable value. Appreciation is also expressed to Mrs. Margaret M. Nice, Dr. Ernst Mayr, Dr. A. L. Rand, and Dr. S. C. Kendeigh for critical reading of the manuscript. Abstracts of certain European papers were kindly loaned by Mrs. Nice.

METHODS

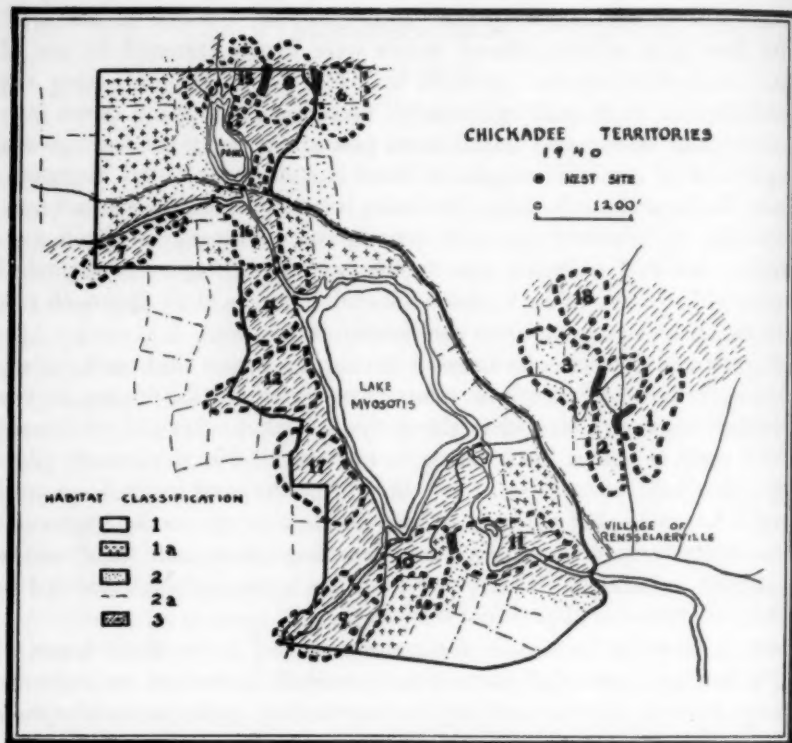
Both colored celluloid and numbered aluminum bands furnished by the Fish and Wildlife Service of the U. S. Department of the Interior were used, the former to permit individual recognition in the field. The free ends of the colored bands were firmly fastened by use of Duco household cement (acetone may also be used) eliminating any possibility of birds pulling them off or of bands slipping down over one another where two bands were placed on the same leg. Not a single case of a lost or misplaced band has yet come to my attention. Since the tarsal length of the chickadee is limited, colored bands 3 mm. in width (half-bands) were frequently used instead of the 6 mm. bands. No real difficulty was experienced in seeing even the small bands with the use of an 8-power binocular since a close approach can usually be made, especially in the vicinity of the nest.

Eighty adults were color-banded during the winter and early spring, making it possible to follow many birds from the beginning of the breeding season without disturbing them further. Several additional adults were captured for banding or examination at the nest by placing a small net over the entrance hole after the bird entered. A trap door was not needed since most individuals were not easily frightened out. Only four out of thirty birds breeding on or near the Preserve remained unbanded. Thirty-one nestlings were also color-banded in order to follow the dispersal of the young.

All nests were located in natural situations; no artificial boxes of any kind were provided since it was particularly desired to study territory, nesting habits, and population density under natural conditions. In order to observe the contents of nesting cavities a portion of the front of the cavity was frequently cut out with a small coping saw and the piece held in place by wire wrapped around the nest tree. In this way the front of the cavity could be removed easily whenever needed. In no case were the birds disturbed for more than a few minutes after the initial cutting.

The study area.—All observations of chickadees were made within an area roughly two miles in diameter. Included in this study area are the village of Rensselaerville and the Edmund Niles Huyck Preserve of 476 acres, within which the most intensive study was carried out. The region is located on the Helderberg penneplain of eastern central New York at an elevation 1400 to 1700 feet. Ecologically, it lies in the ecotone between the northern coniferous forest and the eastern deciduous forest areas or biomes (roughly equivalent to the eastern portion of the transition life-zone). A wide variety of habitats

is present ranging from recently abandoned fields through various young forests to young beech-hemlock climax, as is partially indicated by Text-figure 1.



TEXT-FIGURE 1.—Territories of chickadees in June 1940. The boundary of the Edmund Niles Huyck Preserve is indicated by heavy solid line. Chickadee territories at maximum size defended are indicated by heavy dotted lines. Solid lines between territories indicate points where actual boundary disputes were observed between adjacent pairs. The habitat classification is as follows: (1) abandoned fields, herb and shrub stages; (1a) abandoned fields, artificially planted to conifers 10-13 years ago; (2) young forests or 'second growths'; (2a) hedgerows; (3) mature forests of beech-maple, beech-hemlock, etc.

The spring of 1940 was generally late, following a severe winter in which the heaviest snowfall occurred between February 15 and March 15. Snow formed a continuous cover until April 1, while five inches of snow fell on April 13, and ten inches on April 21. Ice, generally a good seasonal indicator, did not completely leave the ponds until May 1. The break-up of winter chickadee flocks and appearance of

definite mating behavior did not take place until the period between April 10 and 25, during which maximum daily temperatures varied from 34° to 52° F.

THE CHICKADEE POPULATION

The Black-capped Chickadee is the only member of the Paridae present in the region. It is the most abundant bird species which occurs in the study area throughout the year; however, there is considerable seasonal variation in numbers and the population is not entirely resident. In 1939-40, the population on the Preserve itself was greatest and most variable in late summer and fall. The winter population was approximately fifty as compared with twenty for the breeding season. In the village (located in the valley and supplied each year with feeding stations) the winter-summer population ratio was about 40-4. Most of the breeding birds were present in winter although several moved as far as a mile from winter range to summer territory. Of thirty breeding adults (fifteen pairs) on or near the Preserve, nineteen had been banded during January and February, two during mid-March, and the winter whereabouts of nine were unknown. On the other hand some 35-40 banded birds regularly present on the study area in winter and early spring disappeared during the breeding season. Similar seasonal changes in population have been reported by Dr. George J. Wallace (1941) at Lenox, Massachusetts, and by Butts (1931) at Ithaca, New York.

PAIR-FORMATION

In life-history study the importance of the preliminaries to actual reproduction has been emphasized in recent accounts of courtship and pair-formation by Lorenz (1935), Tinbergen (1939), Noble (1939), Lack (1940), and others as well as by the development of the territory theory by Howard (1920). In most passerine birds that have been adequately studied the male first establishes a territory; courtship and mating then take place when the female enters the territory. In the chickadee, however, my observations indicate that the sexual bond is formed before and usually not in connection with the establishment of nesting territory which is defended later. Steinfatt (1938) likewise states that pair-formation in seven species of European wood titmice (including *Parus atricapillus salicarius*¹) is not dependent on the presence of a nesting territory.

Permanence of mating.—There is considerable evidence that paired birds of many Paridae maintain an attachment for each other beyond the breeding season or may remain mated for life. Permanent mating is reported in several European species. Steinfatt (1938) found that

Marsh Tits (*Parus palustris*) wander about in winter in pairs and states that this species, the Crested Tit (*Parus cristatus*) and the Willow Tit (*Parus atricapillus salicarius*)¹ are permanent residents and mate permanently in East Prussia. Warga (1939) in fourteen years of banding Great Tits (*Parus major*) at Budapest did not record any change of mates from season to season provided both birds were alive although the birds traveled in flocks in winter. Kenrick (1940) found that Blue Tits (*Parus caeruleus*) in England were partly migratory and partly resident but that the same mates were usually retained from season to season. However, he records one case of a male mating with a female whose mate of the previous year was still alive.

In regard to the North American Paridae, Price (1936) states that the Plain Titmouse (*Baeolophus inornatus*) in California is usually seen in pairs the year around and keeps the same mate from year to year. The same may be true of the Tufted Titmouse (*Baeolophus bicolor*) (Gillespie, 1930). Nice (1932) reports a case of a pair of Carolina Chickadees (*Penthestes carolinensis*) which remained associated three winters and two summers in Ohio. In the case of the Black-capped Chickadee, Baldwin (1934) records several pairs which she believed remained mated for two or more seasons in Massachusetts. She particularly noted nesting pairs returning to the feeding station together in the fall. Butts (1931) in a two-year study at Ithaca, New York, did not record any cases of the same mates in successive years, but believed this due to disappearance of one of the pair.

While little regarding the permanency of mating can be determined in a one-year study the following observations may have some bearing on the question. Of 18 pairs followed during the spring and summer seven were formed from birds which were members of the same winter flock. The mates of two pairs were from different flocks (as much as a mile apart in one case) and one mate in each of nine pairs was not banded during the winter. Since every effort was made to band all birds wherever banding was carried on, it is fairly certain that these unbanded birds were not in the flocks with the banded birds, or at least not regularly associated with them. Thus, in about 60 per cent of the cases a paired condition could not have been maintained over the winter. Of course, mortality might account for this since the chickadee is a comparatively short-lived species. Wallace (1941) at Lenox, Massachusetts, found that the mortality from winter to winter was about 30 per cent from 1937 to 1938 and over 40 per cent from

¹ *Parus* (*Penthestes*) *atricapillus salicarius* occurring in Central Europe and *P. a. kleinschmidti* occurring in England are generally regarded as subspecies of our Black-capped Chickadee (*Penthestes atricapillus*).

1938 to 1939; he also believed that mortality over the winter of 1939-40 may have been greater than during the previous two winters. Therefore, the chances of at least one member of a pair not surviving from one breeding season to the next would be considerable.

In regard to the seven intra-flock matings there was little evidence to indicate a mated condition prior to the time the pair actually separated out from the flock in the spring. In general, no definite ties between any two individuals could be discovered in the winter flocks; no two birds tended to feed together day after day or to show by notes or behavior special attachments for each other, even though the same individuals tended to remain associated in the same flock all winter. It is quite possible that some pairs did exist within the flocks but I could discover no way of identifying them when their history during the previous breeding season was unknown. On the other hand, in early September of 1940, two known nesting pairs were observed still together although not especially closely associated in flocks otherwise composed of wandering juveniles not their own offspring.

To sum up, the scattered evidence from banding indicates that the pair in the Black-capped Chickadee and in the Paridae in general tend to remain together after the breeding season, may remain in or return to the same wintering area, and, if alive (or present in the same region), are likely to nest together the next breeding season. In the chickadee, however, which unlike certain other species (i. e. the Marsh Tit or Plain Titmouse) flocks in winter, it is not clear whether birds actually remain paired during the winter or simply remain in the same region and remate again in the spring. If pairs are maintained apparently the bond between them is very loose during the winter flocking period. Perhaps pairing in the chickadee is intermediate between the type seen in many passerine species in which the birds definitely separate after the nesting period and that of such a species as the Wren-tit (*Chamaea fasciata*) in which the pair remain very closely associated and hold a territory throughout the year (Erickson, 1938).

Courtship and mating.—The first evidence of courtship and definite breeding pairs, as already mentioned, did not take place this year until the period of April 10-25. Prior to this in late March there was some movement of birds from flock to flock and some new birds appeared in flocks where there had been little change all winter. Banders in the Northeast have frequently recorded this early-spring movement with new birds appearing at feeding stations (e. g.), Butts, 1931; Bowditch, 1938). In the present case it was definitely known that part of this

movement was a local shifting of the banded population and part was due to appearance of new birds of unknown origin, or disappearance of banded birds. The break-up of the flock was a gradual process. In one flock which was followed from day to day, pairs or single birds separated out a few at a time until only one or two pairs remained to establish territory and nest on the winter feeding range. In the case of a flock occupying the center of the village, the area was evacuated completely by chickadees thus leaving no nesting pairs. This is undoubtedly what happens in city parks and other places where chickadees occur in winter but do not nest. Some of the birds were followed or later located at nearby points but many could not be found, apparently having moved a greater distance than could be covered in this study. Dispersal was in all directions, but there was a definite tendency to move up the valleys and hills; in winter, birds were concentrated in the vicinity of the village located in the valley and many of the birds moved into the hills to nest.

Despite a close watch on behavior during the pairing period, no clear-cut courtship ritual was observed. In some cases two birds would be seen in flock formation with others showing no particular interest in each other; then several days later would be noted definitely paired and traveling together. In other cases banded single birds were known to separate from the flock and were observed moving about alone; then several days later these birds would be found paired with an unbanded bird. The first unmistakable pair was observed on April 11; the last flock comprising four birds on April 27. After the latter date only pairs or single birds were seen until the appearance of the first young. A total of nineteen pairs involving banded birds was located during the spring. The territories of fifteen of these pairs are shown in Text-figure 1. The case histories of the two best-known pairs are given below. The male of pair no. 1 was present all winter but the female did not appear in the same flock with the male until March 15; hence this pair could not have been mated over winter. Both male and female of pair no. 2 were members of the same winter flock but there was no conclusive indication of their being mated until about April 25.

Pair No. 1 (A-RG and A-BIR)

April 11, 10.45 a.m.—Female, A-BIR, feeding in close company with male A-YR (not her subsequent mate). Female observed to flutter wings lightly when male came near; he, however, made no response to this behavior. 12.15 to 1.00 p.m.—Two above birds now traveling in flock of five birds which includes male A-RG, with male A-RY and female A-YB which subsequently formed pair no. 2. All

five birds fed and moved together in typical flock behavior with no indications of possible pairs. However, male A-RG twice observed chasing male A-RY.

April 12-13.—Snowstorm; flock of eleven birds visiting feeding station intermittently all day including subsequent pairs nos. 1 and 2. Winter behavior entirely.

April 13-19.—Birds visiting feeding station reduced again to five birds noted together April 14. Birds visit station together or singly; no evidence of definite pairing.

April 20-23.—Second snowstorm; eight birds now in flock exhibiting only winter behavior.

April 27.—A-RG and A-BIR noted separated from flock and going to roost in adjacent spruce trees, first evidence of pairing; previous to roosting the birds kept close together and uttered only the low conversational *seep* call. The roosting place was not the same as used by the flock in winter.

May 3.—Pair no. 1 appeared at feeding station while pair no. 2 was there; much *phoebe*-ing and chasing of each other followed with all four birds engaged in the fight. At this time it was clear that pairs were definitely formed and paired birds antagonistic toward others. Also territory establishment was beginning.

May 4.—Pair no. 1 observed going to roost in same place as on April 27.

May 6.—Pair no. 1 observed excavating a cavity about 300 yards from above roost.

Pair No. 2 (A-RY and A-YB)

April 11.—Male A-RY in a flock of five as mentioned above. At 10.40, male also noted alone flying back and forth in the tree tops giving loud *phoebe*-songs.

April 16.—Male noted alone, alternately feeding and calling *phoebe* loudly.

April 24.—Male appeared in tree with pair no. 13 (G-Gr and G-BR), two birds which spent the winter on another winter range and were already paired at this time. Much *phoebe*-ing and chasing followed. Both members of pair no. 13 chased male A-RY until he finally withdrew. This was not a territorial squabble since pair no. 13 later moved out of the region.

April 25.—Male noted with female A-YB, first time two definitely noted together.

April 28.—A-RY and A-YB appear at feeding station together, apparently mated. Birds keep close company and continually call to each other with low *seep* notes.

April 29.—Pair excavating a cavity.

May 3.—Have squabble with pair no. 1 at feeding station as described above.

May 6.—Pair abandoned first attempt at excavation and have nearly completed a second cavity. The territory adjoins that of pair no. 1.

May 11.—Pair at feeding station; female begging and male feeding her; first time this behavior noted in this pair.

Observation on formation of other pairs did not reveal anything very different from the above. If there is a definite ceremony necessary to "weld the sexual bond" as seems to be the case in many species, it is inconspicuous or I have failed to see or recognize it. Definite courtship displays have been described for some Paridae (the Blue Tit, Great Tit, Marsh Tit,—Witherby et al., 1938) involving display of conspicuous markings or 'nuptial flights'. I have found no reference to a courtship display in either the American or the European

atricapillus, although the black-and-white head pattern would seem to have possibilities in this direction. Whether or not there are definite courtship displays, it seems likely from the evidence at hand that pairs form not as a result of a brief conspicuous ceremony but come together gradually as Lack (1940) suggests may be the case in many species, particularly those which pair from flocks. Thus, in the above case histories, the female of pair no. 1 seemed to be pairing with male A-YR on April 11, yet she eventually paired with male A-RG although A-YR remained unmated in the vicinity until April 28, after which he disappeared. Also, birds would be seen alternately scattered and in compact flocks in the same day or on successive days. The two snowstorms may well have interrupted pairing. All this would point to the gradual formation of the pairs.

The problem of pair-formation in the chickadee is made more difficult not only because territory is not involved but also because the sexes are alike in plumage. Chickadees quickly learn to recognize one another as individuals as is shown by the development of a definite dominance order (or 'peck order') in the winter flocks, but this does not necessarily mean that the birds are capable of discriminating sex on basis of appearance alone (Lack, 1940). Consequently, we would expect behavior or voice to be important in sexual recognition and mating. Increasing restlessness and increasing use of the *phoebe*-song are the two most noticeable changes in behavior preceding pairing. Birds were often noted flying back and forth in the treetops and males were several times observed to engage in vocal duels while flocks were still largely intact. Both sexes may utter the *phoebe*-song but the male gives it more frequently and generally much louder. In this region the three-note version was heard about as frequently as the two-note version. Both versions may be given by the same individual and the songs seem to serve the same purpose. In the spring the loud *phoebe*-song given by the male apparently functions to intimidate other males and to attract the females, as indicated by behavior of A-RY noted above. Later, the *phoebe*-song functions in territory defense; at other seasons it does not seem to have a definite function, unless possibly it is used to establish dominance in flocks during late summer when the note is frequently given by young birds. Thus, the same note may serve different purposes or evoke different responses depending on the season and physiological state of the bird.

Dominance undoubtedly plays some rôle in mating. In the winter flocks, males were generally dominant over females, that is, females withdrew or were driven away when they came in close contact (as at a feeding station) with males. There were, however, cases where

females were dominant over certain males. This winter behavior is probably to be classed as social dominance, which, as Noble (1938) has pointed out, is to be distinguished from sexual dominance. In pairs 1 and 2 and in all other pairs where the winter-dominance relations were known, the male was dominant over the female when the two were in the winter flock. However, after pairs had formed or separated out of the flock, I did not observe the male of the pair exert dominance over his mate (except on one occasion when a newly formed pair visited the feeding station). There was no 'pouncing' by the male as Nice (1937) describes as frequent in the Song Sparrow prior to egg laying.

Dominance may also play a part in the relation between males. The two males of pairs 1 and 2 were respectively the top two birds in the 'peck-order' of their winter flock and these two were the only two males which remained to establish territory on the winter range. Male A-GR was about no. 3 in the social order and he nested nearby (see pair no. 3, Text-figure 1). In this case the most dominant males were the most sedentary; or perhaps they were dominant because they were sedentary and had held territory there the previous year. Whether this correlation is significant or simply coincidental, of course, can only be determined through further study of rôle of dominance.

The feeding of the female by the male, called 'courtship feeding' by Lack (1940a), is apparently not part of the courtship in chickadees. True, the male regularly feeds the female during incubation and sometimes during egg laying or nest construction, but with one exception I did not observe this behavior in newly paired birds. Usually from a week to two weeks elapsed between the first observation of definite pairs to the first observation of begging by the female and feeding by the male. In the case history of pair no. 2 above, the birds were paired at least fourteen days and had excavated two cavities before the begging-feeding behavior started. The first pair was observed April 11, while the first observation of begging by a female was May 9.

Whether or not copulation takes place immediately after formation of the pair or is delayed until the nest is under way was not determined, although the later would seem to be the case. Copulation was observed only once (in pair no. 15) curiously enough at a time when the female had already started incubating eggs. During the act the female fluttered her wings and uttered a high-pitched twitter.

Noble and Lehrman (1939) found that in the Laughing Gull courtship ritual was repeated in abbreviated form during ceremonies at the nest; hence it might be possible to obtain clues on courtship

behavior from the more easily observed nesting behavior. When the male approaches the nest during incubation he regularly utters the *phoebe*-song softly and female may answer with a soft twitter. When the sexes meet at the nest both birds often flutter their wings and give high-pitched twitters.

The importance of the loud *phoebe*-note of the male and perhaps also wing fluttering and twittering by the female is indicated by the behavior of birds which had lost their mates. This happened several times during the season. When a female disappears either temporarily or permanently the male calls loudly using both *chickadee*- and *phoebe*-notes, particularly the latter. The most interesting case of loss of mates and remating was as follows:

Pair no. 5 was first observed mated on April 11 and seen again on April 15. Neither was seen again until May 15 when female, R-RB, was seen begging from an unbanded male (thus making pair no. 16) in an adjacent area where the nest was subsequently found (Text-figure 1). Her former mate was not found and had presumably perished. In the meantime, pair no. 6 were excavating a cavity on an adjacent territory (see Text-figure 1). About the middle of May the female of pair no. 6 disappeared. Between May 20 and June 10 the male remained on the territory, was observed to defend it against male of pair no. 8 and spent much time cruising the territory and giving loud *phoebes* at intervals. On June 10, still not having attracted a new mate, he apparently abandoned his territory since he was seen moving in the direction of the territory of pair no. 16. In the meantime the male of pair no. 16 had disappeared on June 12 and female was feeding the young alone on June 15. On June 17, the male R-BY (formerly of pair no. 6) appeared at the nest and was helping the female feed the young. The female was observed to flutter her wings, utter a high rolling twitter, and to hop about in front of male as if begging copulation; the male, however, appeared disinterested and even hopped away when female came too close. Later the performance was repeated; in the meantime, the female continued to feed the young and the male remained near. On June 18, the young left the nest and both adults fed young; however, the male fed less frequently, showed interest in cavities and *phoebed* a great deal. On July 5, male was seen alone *phoebe*-ing and investigating cavities. Finally, the pair returned to the same cavity, laid a new set and raised another brood. This move was a complete surprise so that I did not discover the new set until they were hatched. This pair (no. 17) succeeded in raising the brood and were still together in September. Thus the female, R-RB, had three mates and raised two broods (the only case of a second brood recorded in this study) and the male, R-BY, had two mates and raised one brood.

There were only two other known cases of disappearance of mates in fifteen pairs studied most closely. In one case (pair no. 2) the female disappeared shortly after egg laying. The male remained on the territory a week, spent much time *phoebe*-ing and was observed to have a territorial boundary dispute with male of pair no. 1. He then disappeared, perhaps moving elsewhere in search of a mate. In

the other case the male was accidentally killed in experimental work after young had hatched. The female continued to feed young and care for brood successfully and did not take a new mate so far as was known. No cases of polygamy were encountered in this study.

Behavior of newly paired birds.—After the pair is formed (or separated from the flock) there follows a short period before active nesting or establishment of territory takes place. For convenience, this period will be called the 'pre-nesting period'. The length of the pre-nesting period apparently depends on the lateness of the season and on the weather. It was longest in the case of birds which paired early. For instance, in pair no. 6, fourteen days elapsed between the first observation of pairing (April 15) and the beginning of cavity digging; pair no. 2, which were apparently not definitely mated until April 25, began digging a cavity five days later. The behavior of six pairs was observed closely during the pre-nesting period with a total of ten hours being spent following the birds about.

During the pre-nesting period the pair may remain in the area where they were first observed paired; this area may or may not be within the winter range of one or both birds. However, in at least two cases (pairs no. 4 and 9), the mated birds moved slowly across country for a mile or so before settling down to nest. In one case the birds were actually followed during this wandering movement. Pair no. 13 disappeared from the place first observed perhaps moving completely out of the study area. In other cases pairs were not discovered until after the beginning of nesting, so that it was not known whether or not pairing occurred on the future nesting territory.

In all cases the mates remain very closely associated throughout the day. The daily activities consist of feeding, resting, preening, and sometimes half-hearted examination of possible nesting sites. The two birds generally move leisurely and keep contact with each other through the use of the soft *seep* conversational note, the same note continually given by birds when in flocks. As long as the mates remain together (within five to forty feet) and no enemy appears, there is little other vocal activity; hence pairs are hard to locate unless one's ear is tuned to pick up the soft *seep* calls. If birds stray apart they may employ the regular loud *chickadee* call note to aid in locating each other. If a winged enemy appears, the warning note, a high-pitched *see-see* is given and birds 'freeze', the same behavior and response frequently observed during the flocking period. As previously stated, the female was not observed to beg during the pre-nesting period. In fact, there is nothing in the behavior of the pair to indicate which is male and which female. Neither sex seems to be the leader during

feeding excursions since first one bird then the other would be observed moving ahead. All this behavior is similar to that of non-breeding flocks; in fact, a pair during the pre-nesting period act very much like a flock of two, except for one important thing: the pair in contrast with the flock isolates itself and is antagonistic to other members of the species. If another chickadee or pair is encountered immediate antagonism develops. Both birds call excitedly with the *chickadee* note, various sputtering variations of it, and the *phoebe*-song (particularly by the male). If the intruders come close a *mélée* follows with birds chasing each other about, or actual fighting may take place. Such *mélées* were observed several times during latter part of April. Both birds of the pair take part in the protests. Sometimes two pairs would be involved. In another case a pair encountered a single bird and both members of the pair were seen to chase the single bird. In still another case, five or six birds, perhaps three pairs, were involved in a *mélée* although it was difficult to determine just what was going on. Generally, after several minutes of loud calling, chasing, and flying about the pairs drift apart and go on their way. In several cases the fighting was clearly a defense of mates and not territory since the birds involved later established territory elsewhere and the area where the fighting took place was not a part of these territories. To follow the terminology of Noble (1939), this fighting might be interpreted as defense of a 'sexual territory' as contrasted with a later-established 'nesting territory'.

TERRITORY

Establishment.—As has been previously indicated, the territory in the chickadee is principally a nesting territory which may or may not coincide with the area where mating takes place. Also, as just described, paired birds may cruise about for several days before establishing a nesting territory on which they remain fixed for the nesting period. Several pairs established territory immediately on the wintering range occupied by both birds. However, in most cases the territory and the winter range did not coincide. Establishment of territory seems to begin about the time of the start of nest construction; it is quite probable that the finding of a suitable nesting site is a determining factor in territory establishment.

Defense.—As I interpret my observations, fighting for the mate (or 'sexual territory') gradually changes to fighting for territory ('nest territory'). Thus, when a pair encounters other chickadees during random movements of the pre-nesting period the birds become antagonistic to other chickadees but 'defend' only a small area around

themselves. When territory is established on the other hand, an area of considerable size is defended. That defense of territory is definitely separate from defense of mate, is shown by the fact that the male will drive another male out of the territory even though his mate is not present on the occasion (observed three times), or the male may even defend the territory vigorously against another male even when his mate has been lost (observed twice).

The male assumes the leading rôle in defense of the territory although the female may join him in the defense. I did not observe the female defending the territory alone. The defense procedure does not seem to be as elaborate in the chickadee as Nice (1937) describes for the Song Sparrow. In the Song Sparrow there are five parts to the defense behavior; from observations on the chickadee I would distinguish at most three parts, as follows. (1) The challenge: When a territory is invaded the male challenges the invader with loud *chickadee* calls and especially loud *phoebes*. The invader may answer the challenge with similar notes resulting in a 'vocal duel' or he may retire immediately. (2) The chase: If the invader stands his ground a chase follows with one or both birds chasing the other. Preceding the actual chase birds may fly back and forth near each other with loud *phoebe*-songs. (3) The fight: In one case an actual fight was observed in which the birds tangled in mid-air and fell to the ground together. This occurred on the boundary of two established territories and after the fight the males retired to their respective areas. In general, the defender takes the initiative in calling and chasing, and the invader either retires or dodges the attacks. No wing fluttering or 'puffing up' was observed although during the challenge the male stands very straight and, I believe, may raise the feathers on the head bringing the black-and-white pattern into prominence. According to Tinbergen (1937) territorial quarrels of Great Tits mostly take the form of threats involving display of color marking and other behavior rather than, or in addition to, the use of vocal powers.

The chickadee does not regularly proclaim or announce ownership of its territory, which is interesting in view of the fact that so many passerines spend much time announcing by song from exposed perches. Once settled on a territory the male (as well as female) sings very little, if at all, so long as he is successfully mated and is not challenged by another bird. The male rarely sings regularly from an exposed perch. A nesting pair of chickadees is usually very silent and often hard to locate after nesting is under way as is also indicated by frequent references in the literature to the "disappearance" or "shyness" of chickadees during the nesting season. Consequently, the singing-male

method of censusing cannot be used in determining the population of nesting chickadees. A chickadee which is doing a lot of singing is usually an individual looking for a mate or one having territorial trouble with a neighbor or intruder.

The chickadee does not regularly defend its territory against other species as does the Song Sparrow (Nice, 1937). Only once was a chickadee observed to make a hostile move toward another species other than a predator; in this case a male chased away a transient Brown Creeper that happened to alight on the nest tree during nest excavation. Often pairs of chickadees are accompanied in their movements over the territory by warblers and other transients, the same association which frequently occurs in the fall flocks.

The territory seems to be defended until the young leave the nest, although defense was observed most frequently during the early part of the cycle while territories were being formed and many birds were still unsettled. Defense was observed only twice after hatching of the young. On one occasion the male challenged and chased out a lone unbanded bird while on the way to feeding the young. In the other case, the young had just left the nest; the adults were scolding me when a lone unbanded adult appeared, probably attracted by the scolding. The parents immediately stopped scolding and began chasing the intruder; first the male, then the female chased the bird until it retired.

Soon after the young leave the nest, territory defense apparently stops or becomes very weak; even before this, flocks of young birds may be tolerated. One male which was feeding young in the nest paid no attention to a small flock of juvenile chickadees which entered the territory from an adjoining area. One of these juveniles was observed to beg from the male, but he did not feed it.

Most cases of territory defense were observed between rival males of adjacent territories as indicated in Text-figure 1. As can be seen from this figure the density of population was not great and except at certain points the territories were not crowded together. With a higher population more territorial fighting might be expected.

Size of territory.—Text-figure 1 shows the territories of all the pairs nesting on the Preserve and also of a few pairs in adjacent areas which were watched closely. The heavy dotted lines outline the maximum area known to be patrolled and defended by birds during the early part of the nesting cycle of the first nesting attempt. The numbers indicate the pair which occupied the territory. The solid lines between territories indicate points where boundary disputes between rival males were actually observed. In the case of pairs nos. 15 and

8 territorial defense by rival males was observed three times at the same place. Each time the behavior of the two birds was very similar, the same trees, almost the same limbs being used during vocal challenging and chasing. Finally, both birds would retire to their respective sides continuing to challenge each other. On June 1, the male of pair no. 8 had a border dispute with the male of pair no. 6 at 9.45 a. m., then at 10.00 a. m. moved over to the other side of his territory and had a fight with male of pair no. 15, his other neighbor. The repeated occurrence of disputes at the same point suggests that where pairs are close together and territories crowded, the boundaries may be very sharp, almost as if there were an actual line. On the other hand, where there is no pressure from neighbors the boundaries seem to be much less definite, as for instance the south boundaries of the territories of pairs no. 8 and 15. Territory boundaries are indicated in Text-figure 1 by dotted lines in order not to give the false impression of absolute sharpness of limits. The longer the observation the more it became apparent that borders fluctuated from time to time, especially as the nesting period progressed. It was only at points of contact that boundaries seemed sharply established.

With the aid of a planimeter the size of the territories as drawn in Text-figure 1 was calculated. Territories varied from 8.4 acres (3.4 hectares) to 17.1 acres (7 hectares) with an average of 13.2 acres (5.3 hectares). There would probably be less variation in size of territory if the volume of the habitat rather than the area could be determined since the larger territories (pairs nos. 1, 2, 11) contained considerable open or sparsely wooded country. It is interesting to note that the average size of the winter-flock range was 20 to 25 acres, so that the territory of a pair was about half that covered by the average flock during the winter fixation period. In spring or fall, of course, individuals, pairs, or flocks may range more widely.

As previously mentioned, Text-figure 1 represents size and shape of territories at beginning of the nesting cycle. If a close study of three or four of the pairs can be judged as representative, the size of the territory decreases as the nesting period progresses. Thus, during building, egg laying, and incubation birds avoid the vicinity of the nest except when engaged in attentive duties and spend much time ranging over the territory feeding or resting. On the other hand, when the young hatch the parents tend to gather food near the nest. This tendency increases progressively until by the time young are ready to leave, the parents are flying only a short distance for food, as Butts (1931) also noted. True, they may still occasionally visit the other part of the territory, but much less frequently and hence would

have little occasion to defend it. Pair no. 15, which was observed frequently, covered only about half the area while feeding the young that they did during incubation. This would seem to support the contention that territory establishment is not for the purpose of conserving a food supply since not nearly so large an area as was originally staked out is needed when the demand for food is greatest. Therefore, the function of the nesting territory in the chickadee must be simply to protect the pair from the disturbing influences of other chickadees during the period of nesting.

Habitat.—The chickadee territories very often included two distinct habitats. In Text-figure 1, the area under study is divided into three broad habitat types represented by three stages in vegetative succession: (1) abandoned fields covered with herbs and shrubs representing early seral stages; (2) young forests or 'second growths' of cherry, birch, aspen, willow, ash and maple or combinations thereof representing intermediate seral stages; and (3) mature forests of elm, ash, maple, beech-maple, beech-hemlock, etc., representing advanced seral stages. Young conifer plantations (1a) which represent an artificial early seral stage as well as the numerous hedgerows (2a) which ecologically are probably to be included under (2), are also indicated. Abandoned fields either naturally or artificially reclaimed were not occupied appreciably during the nesting season so that territories were established in types 2 and 3. Furthermore, both types were often included in a given territory (Text-figure 1) since the nest was often located in a comparatively open situation, such as a young forest, hedgerow, or field border, and the feeding-resting activities were largely carried on in deeper woods. Thus, to use the terminology of European bird ecologists, the nesting biotope often differed from the feeding-resting biotope as is illustrated by territories 1, 7, 10, 15, and 16. Mayr (1928) described the same thing for the European *atricapillus* or Willow Tit. Territory 10 is especially interesting. The nest was located in a cherry stub out along a hedgerow with open fields or pine plantations on all sides. The birds when not engaged in nest duties spent all their time in the woods and were frequently observed flying back and forth along the hedgerow from nest to woods. Such a double-habitat territory would seem to result from the type of nest tree needed. The chickadee is unable to dig a cavity except in very soft or rotten wood. The most suitable soft-wood trees such as birch and pin cherry occur as living trees in the early seral stages but are short-lived and persist in the intermediate seral stages as decayed stubs. By the time the mature forest develops, all are gone and the dead timber is mostly harder wood less suitable for

excavation. Where woodpecker holes are used (as by pair no. 4) or bird boxes this nest-habitat requirement might not be a limiting factor.

Population.—Ten pairs of chickadees established territory within the approximate boundaries of the Huyck Preserve at the beginning of the season. Since the Preserve contains 476 acres this represents one pair to 47.6 acres, or, excluding the 103 acres of water, one pair to 37.3 acres (15.1 hectares). If, however, we exclude the 153 acres of field habitat and conifer plantation which were not occupied by nesting birds, we get one pair to 22 acres (9 hectares) of chickadee habitat. Butts (1931) found two pairs nesting on the 80-acre Fuertes Sanctuary in two successive years. The total area of the ten territories on the Preserve is 121 acres, leaving 99 acres of chickadee habitat unoccupied. Since the average size of all territories was 13 acres it might be concluded that the area could have supported seven more pairs or a total of 17 pairs. However, it seems probable that this theoretical density would never be reached, at least not with the arrangement and size of territories as existing in 1940. As can be seen from Text-figure 1 there is room for only three or four more territories which would be likely to include the proper nesting and feeding biotopes. There seems to be room for territories on either side of no. 11, between nos. 9 and 17 and perhaps at one or two other places. These areas have suitable nesting stubs.

The total chickadee population in winter was approximately 50 to 60 birds as compared with the summer population of 20 and the theoretical maximum of 34 birds. Hence it appears that the area is capable of supporting more chickadees in winter than in summer. This suggests that the territorial habit together with the nesting requirements are important factors in regulating breeding-population density.

DISCUSSION

As has been indicated, the territorial behavior of the chickadee differs from that of many passerines in two respects: (1) territory is established after, rather than before pairing, and (2) the birds do not make themselves conspicuous on it. Thus, neither Tinbergen's (1936) definition of territory (i. e., "an area which is defended by a fighting bird shortly before and during the formation of the sexual bond") nor Mayr's (1935) definition ("an area occupied by a male of a species which it defends against intrusions of other males of the same species and in which it makes itself conspicuous") is strictly applicable to the chickadee. Yet the chickadee is certainly territorial since

the pair restrict themselves to and defend an area during a part of the breeding season. The more the territorial behavior of different species is studied the more evident it becomes that the term 'territory' should not be defined too closely if the concept is to be useful in the study of birds or vertebrates generally. Rather, different kinds of territory should be recognized as Noble (1939) has pointed out. The chickadee may be said to hold a 'nesting territory' but apparently not a 'mating territory' or at least the two may not be the same.

LITERATURE CITED

- BALDWIN, DOROTHY A.
1934. Three returning mated pairs of chickadees. *Bird-banding*, 5: 47.
- BOWDISH, B. S.
1938. Chickadee movement at Demarest, N. J. *Bird-banding*, 9: 159.
- BUTTS, WILBER K.
1931. A study of the chickadee and White-breasted Nuthatch by means of marked individuals. II. The chickadee. *Bird-banding*, 2: 1-26.
- ERICKSON, MARY M.
1938. Territory, annual cycle, and numbers in a population of Wren-tits (*Chamaea fasciata*). *Univ. of California Publ. in Zool.*, 43: 247-334.
- GILLESPIE, MABEL
1930. Behavior and local distribution of the Tufted Titmouse in winter and spring. *Bird-banding*, 1: 113-126.
- HOWARD, H. E.
1920. *Territory in bird life*. London, John Murray.
- KENRICK, HUGH
1940. A study of Blue Tits by colour ringing. *British Birds*, 33: 307-310.
- LACK, DAVID
1940. Pair-formation in birds. *Condor*, 42: 269-286.
1940a. 'Courtship feeding' in birds. *Auk*, 57: 169-178.
- LORENZ, KONRAD
1935. Der Kumpan in der Umwelt der Vogels. *Journ. f. Ornith.*, 83: 137-213.
- MAYR, ERNST
1928. Weidenmeisen-Beobachtungen (*Parus atricapillus salicarius*). *Journ. f. Ornith.*, 76: 462-470.
1935. Bernard Altum and the territory theory. *Trans. Linn. Soc. New York*, 45: 24-38.
- NICE, MARGARET M.
1933. Robins and Carolina Chickadees remating. *Bird-banding*, 4: 157.
1937. Studies in the life history of the Song Sparrow. I. *Trans. Linn. Soc. New York*, 4: 1-247.
- NOBLE, G. KINGSLEY
1939. The rôle of dominance in the social life of birds. *Auk*, 56: 263-273.
- PRICE, J. B.
1936. The family relations of the Plain Titmouse (*Baeolophus inornatus*). *Condor*, 38: 23-28.

STEINFATT, OTTO

1938. Das Brutleben der Sumpfmeise und einige Vergleiche mit dem Brutleben der anderen einheimischen Meisen. Beiträge z. Fortpflanzungsbiol. d. Vögel, 14: 84-89, 137-144.

TINBERGEN, N.

1936. The function of sexual fighting in birds; and the problem of the origin of "territory." Bird-banding, 7: 1-8.
1937. Ueber das kämpfender Kolmeisen (*Parus m. major*). Ardea, 26: 222-223.
1939. The behavior of the Snow Bunting in spring. Trans. Linn. Soc. New York, 5: 1-95.

WALLACE, GEORGE J.

1941. Winter studies of color-banded chickadees. Bird-banding, 12: 49-67.

WARGA, KOLOMAN

1939. Dauer-Ehen bei *Parus m. major* und Jahres-Ehen bei *Phoenicurus p. phoenicurus*. Journ. f. Ornith., 87: 54-60.

WITHERBY, H. F., F. C. R. JOURDAIN, N. F. TICEHURST AND B. W. TUCKER

1938. The handbook of British birds. I. London.

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BIRD LIFE ON MT. MITCHELL

BY THOMAS D. BURLEIGH

THERE are probably few mountain peaks in North America that are better known than Mt. Mitchell. Rising 6,684 feet above sea level, it is the highest point in the eastern half of the United States, and as such is known at least by name to all familiar with the geography of this country. Situated in western North Carolina, where high altitudes are a characteristic feature of the topography, its supremacy is closely challenged by other mountain-tops, notably Clingman's Dome in the Great Smokies with an altitude of 6,642 feet, and this fact unfortunately robs Mt. Mitchell of much of its impressiveness. Actually the first glimpse of this mountain is rather disappointing, and it is only after the top has been reached that appreciation of its unique attractiveness is realized.

Many changes have taken place on this mountain-top since Professor Elisha Mitchell first explored its upper slopes seventy years ago. Then it was covered with a dense forest of red spruce (*Picea rubra*), accessible only on foot by means of dim narrow trails. So tall and close together did these trees grow that it is said that the sunlight rarely reached the ground, and then only in openings caused by the uprooting of some over-mature tree. The predominating underbrush was endless tangled stretches of rhododendron (*Rhododendron catawbiense*), interspersed with such northern hardwoods as the yellow birch (*Betula lutea*), mountain ash (*Sorbus americana*), and beech (*Fagus grandifolia*). Above 6,000 feet the trees became perceptibly smaller, and the southern balsam (*Abies fraseri*) replaced much of the spruce, while below an elevation of approximately 4,500 feet hardwoods took the place of this coniferous growth.

Today a totally different picture meets the eye. Through logging, and then repeated fires, the thick spruce forest has been so completely destroyed that only at the very summit of the mountain does a narrow fringe remain. Elsewhere the scene is one of utter desolation. Rotting stumps and fire-scarred snags bear witness to man's destructiveness, and so thickly has such deciduous underbrush as the fire-cherry (*Prunus pennsylvanica*) and Canadian elderberry (*Sambucus racemosa*) grown that spruce reproduction is almost negligible. Attempts have been made since 1916 to replant this area with spruce seedlings but the growth of this species is so slow that to date this planting has changed but little the appearance of these mountain-sides.

As might be expected the destruction of the original forest has changed materially the bird life of this mountain-top. Certain species once plentiful, such as the Black-capped Chickadee, have completely disappeared, while others heretofore unrecorded here, as the Song Sparrow, are plentiful now during the summer months in the cut-over area. Sufficient spruce and fir woods remain at the top of the mountain to assure protection and food to such species as the Golden-crowned Kinglet and Brown Creeper, but their numbers are relatively few in comparison to twenty years ago. In direct contrast is the present abundance of the Chestnut-sided Warbler in the denuded area where originally it was unknown.

It is during the winter months that birds are scarcest on Mt. Mitchell, but this is hardly to be wondered at. Because of the high altitude it is not uncommon to have the ground covered with a gradually increasing depth of snow that persists from late November until well into April. Temperatures as low as twenty-two degrees below zero Fahrenheit have been recorded, and for the larger part of each winter the ground remains frozen for a depth of several inches. High winds of varying velocity blow almost daily, and when the temperature has dropped to zero or lower, existence for even the most hardy bird must become somewhat precarious. Food is an important factor in the distribution of bird life during the winter months, and in this case the crop of spruce and fir cones that has ripened in the late fall determines to a large extent the number of birds to be found here at this time of the year. Golden-crowned Kinglets and Carolina Juncos are invariably present each winter, but are far more plentiful if the cone crop is abundant. Red-breasted Nuthatches disappear completely in late fall if, as happens at times, no seed is produced that year, and it is early April before any are seen again. Pine Siskins are equally affected by this lack of seed, and to a certain extent this may also be said to apply to such species as the Hairy Woodpecker and Winter Wren. Despite the severity of the weather it is always possible to find at least a few birds in this fir and spruce woods, even in mid-winter, and under favorable conditions a January day may find nine or ten species represented as the characteristic winter bird life of this mountain-top.

By the latter part of February the first early migrants appear. Song Sparrows venture to the very edge of the fir and spruce woods. Bluebirds can be seen in small flocks in the cut-over area, and there is a perceptible increase in the numbers of such species as the Carolina Junco that have remained throughout the winter. Through March and early April birds that will remain through the summer months

make their appearance, and by the latter part of April the spring migration is practically over. A fact of interest at this time is the very noticeable absence of transients. Records for species other than breeding birds are extremely scarce, and while difficult to explain there is little question but that the higher altitudes are consistently shunned by transients at this time of the year.

It is during the summer months that bird life is at its maximum abundance on Mt. Mitchell. This is due not only to the broods of young that have been successfully reared, but also to the presence of species that have nested in the valleys and then wandered up the mountain-sides in small family parties. Pine Warblers and Black and White Warblers appear with unfailing regularity in late July, Redstarts in August, and these linger until the middle of September. Other species, as the Carolina Wren and the Wood Pewee, are less regular in their appearance, but can be found here at frequent intervals during the summer months. It is possible that this is an attempt to escape the heat of the lower altitudes, but as this habit is apparently confined to a certain few species it is more probable that it is an example of summer wandering prevalent among many birds.

In contrast to the spring months the fall migration is as pronounced at the higher altitudes as in the valleys. From late August until early November transients appear in varying numbers from day to day, and many species not seen at any other time of the year are recorded then. It is surprising, however, how many common birds avoid the higher ridges and apparently never leave the valleys. Relatively few appear in the fir and spruce woods with any degree of regularity, and then only in limited numbers.

The following list of birds observed by the writer on Mt. Mitchell covers an interval of approximately five years, from January 1930, through September 1934. For the first two years, one day each week was spent at the top of the mountain, and while less-frequent visits were made during later years a month rarely passed without at least one trip there. During this time detailed notes were kept of the birds seen, and it is felt that a reasonably thorough knowledge was acquired of the bird life of these higher altitudes. Comment on birds seen near the foot of the mountain is largely omitted at this time. An arbitrary limit of 5,000 feet has been set, and only birds recorded from this point to the top of the mountain are included in this paper. Of the eighty-seven species listed one, Bendire's Crossbill, is here recorded for the first time east of the Mississippi River.

TURKEY VULTURE, *Cathartes aura septentrionalis*.—Seen at infrequent intervals during the spring and summer months, soaring overhead over the top of the mountain. Extreme dates for its occurrence are March 30 (1933), and September 3 (1930).

SHARP-SHINNED HAWK, *Accipiter velox velox*.—Found during the summer and early fall in the thick fir and spruce woods fringing the top of the mountain, where one or two birds can be seen during the course of the day. It is not known to breed. Extreme dates are July 31 (1934), and October 1 (1931).

EASTERN RED-TAILED HAWK, *Buteo borealis borealis*.—Resident in the valleys, and of infrequent and irregular occurrence in the cut-over area throughout the year.

BROAD-WINGED HAWK, *Buteo platypterus platypterus*.—One record, a single bird seen soaring overhead, August 27, 1930.

MARSH HAWK, *Circus hudsonius*.—One record, a single bird seen beating low over the cut-over area (6,000 feet), October 27, 1930.

EASTERN SPARROW HAWK, *Falco sparverius sparverius*.—Of irregular occurrence throughout the year in the cut-over area.

EASTERN RUFFED GROUSE, *Bonasa umbellus umbellus*.—Fairly plentiful in the fir and spruce woods at the top of the mountain where a brood of newly hatched young was seen June 4, 1930. Observed at infrequent intervals in the cut-over area.

EASTERN BOB-WHITE, *Colinus virginianus virginianus*.—One record, a male seen July 5, 1934, feeding at the side of the road through the cut-over area (5,200 feet). It is possible that in time this species may breed at least sparingly at this high altitude as conditions are apparently favorable for its existence here.

WILSON'S SNIFE, *Capella delicata*.—One record, a single bird flushed from the edge of a stream in the cut-over area (5,600 feet), March 21, 1932.

NORTHERN BARRED OWL, *Strix varia varia*.—Although fairly plentiful below an altitude of approximately 5,000 feet, only once has this species been recorded in the thick fir and spruce woods at the top of the mountain. On January 4, 1933, one bird was seen in the top of a tree at the edge of a clearing.

CHIMNEY SWIFT, *Chaetura pelagica*.—Observed but once, two feeding overhead over the top of the mountain, May 23, 1930.

RUBY-THROATED HUMMINGBIRD, *Archilochus colubris*.—A female observed June 5, 1930, in open spruce woods at an altitude of approximately 5,000 feet marks the extreme limit to which this species ventures during the breeding season. By the latter part of July fully grown young appear at the edges of the clearings at the top of the mountain and linger there in varying numbers till the middle of September. Extreme dates for their occurrence are July 20 (1932), and September 17 (1931).

NORTHERN FLICKER, *Colaptes auratus luteus*.—Plentiful in early spring and again in the fall in the cut-over area, a few scattered pairs breeding there each year where old snags offer suitable nesting sites. Rarely observed in the fir and spruce woods at the top of the mountain, the only records being single birds seen September 30, 1932, and March 30, 1933.

RED-HEADED WOODPECKER, *Melanerpes erythrocephalus*.—Of casual occurrence here, and only seen at irregular intervals. The one spring record is that of a single bird seen May 8, 1930, in the cut-over area. In the fall it is more numerous and can be found then about clearings at the very top of the mountain. Extreme dates for occurrence are September 3 (1930), and September 30 (1932).

YELLOW-BELLIED SAPSUCKER, *Sphyrapicus varius varius*.—Although fairly plentiful during the summer months below an altitude of approximately 4,600 feet, this

species consistently shuns the higher ridges and has never been found in the fir and spruce woods. Just once, September 30, 1932, was a single bird seen in the cut-over area (6,000 feet).

EASTERN HAIRY WOODPECKER, *Dryobates villosus villosus*.—Nesting sparingly in the cut-over area this species frequently wanders into the fir and spruce woods at the top of the mountain and can be found there throughout the year. A nest was found May 7, 1931, at an altitude of approximately 5,700 feet, that held noisy young, and was thirty feet from the ground in the trunk of an old rotten stub.

NORTHERN DOWNY WOODPECKER, *Dryobates pubescens medianus*.—Of casual occurrence during the summer and fall months both in the cut-over area and in the fir and spruce woods at the top of the mountain. It apparently does not breed on the higher ridges, and until the young are fully grown does not venture far up the mountain-sides. The only record for the spring months is of a male seen March 21, 1930, in the cut-over area (6,000 feet). Extreme dates for occurrence later in the year are July 17 (1933) (6,500 feet), and December 11 (1930) (6,000 feet).

EASTERN PHOEBE, *Sayornis phoebe*.—A common breeding bird in the valleys, but rarely observed above an altitude of approximately 4,000 feet. The two records for the fir and spruce woods at the top of the mountain are single birds seen August 27, 1930, and July 18, 1931, at the edges of clearings.

EASTERN WOOD PEWEE, *Myiochanes virens*.—Of irregular occurrence in the fir and spruce woods at the top of the mountain during the summer months. Single birds were observed there July 31 and August 4, 1931; September 11, 1932; and September 6, 1934.

HORNED LARK, *Otocoris alpestris*.—One record, a flock of possibly twenty birds seen January 24, 1930, flying from the edge of a clearing at the very top of the mountain.

NORTHERN CLIFF SWALLOW, *Petrochelidon albifrons albifrons*.—Of decided interest was the occurrence of this species in August feeding throughout each day high over the top of the mountain. Although to one familiar with swallows feeding low over open fields and pastures these birds seemed rather out of place at an altitude of 7,000 and 8,000 feet, nevertheless they were a characteristic feature of the bird life of Mt. Mitchell at this time of the year. Countless thousands gather each summer at certain spots in the valleys far below, roosting at night in corn-fields and scattering far and wide during the day, so possibly their presence here might be more or less anticipated. Extreme dates at which flocks varying from fifteen or twenty to fully a hundred individuals were seen are August 4 (1931), and September 1 (1932).

NORTHERN BLUE JAY, *Cyanocitta cristata cristata*.—Of casual occurrence during the summer months, appearing in small noisy flocks in the fir and spruce woods at the top of the mountain from early July until October. Not known to breed above an altitude of approximately 4,500 feet.

NORTHERN RAVEN, *Corvus corax principalis*.—One pair at least nests each year on Mt. Mitchell, and one or more of these birds can be seen almost daily throughout the year about the top of the mountain.

BLACK-CAPPED CHICKADEE, *Penthestes atricapillus atricapillus*.—One record, two birds seen May 8, 1930, in the cut-over area (6,000 feet). Once plentiful here, this species has been driven away by the cutting of the spruce woods and at best can be considered of merely accidental occurrence now.

CAROLINA CHICKADEE, *Penthestes carolinensis carolinensis*.—Plentiful in the valleys, but with apparently little liking for the higher altitudes, this species has been recorded but twice at the edge of the cut-over area (5,000 feet). Two birds were seen in the open spruce woods there August 12, 1930, and two March 11, 1931.

TUFTED TITMOUSE, *Baeolophus bicolor*.—Recorded but twice in the fir and spruce woods at the top of the mountain, and largely of accidental occurrence there. A single bird was seen September 30, 1932, and two a week later, on October 7.

RED-BREASTED NUTHATCH, *Sitta canadensis*.—Resident, but varying in abundance according to the amount of spruce and fir seed that has ripened in the fall. When the crop has been good these birds may be found in small flocks throughout the winter in the narrow fringe of woods at the very top of the mountain. On the other hand if there are few cones the birds disappear in October, and while still found at a lower altitude do not return to the top until the following April. So, during the winter of 1929-30 these birds were plentiful on the higher ridges; were completely absent the following winter; were again plentiful during the winter of 1931-32, and scarce the following two winters. They vary little in numbers during the summer months, scattered pairs nesting wherever old stubs offer suitable nesting sites. A nest found June 6, 1930, in spruce woods at the edge of the cut-over area (5,200 feet) held five slightly incubated eggs, and was twenty feet from the ground in an old rotten spruce stub.

BROWN CREEPER, *Certhia familiaris americana*.—Unlike the preceding this species, while it nests in the fir and spruce woods at the top of the mountain, invariably retreats to the valleys in late fall and has never been found above an altitude of approximately 4,500 feet during the winter months. It is the middle of April before it reappears on the higher ridges but scattered pairs can then be seen there throughout the summer. Two birds that nested unusually late were noted August 10, 1931, feeding young as yet barely able to fly. The nest, found close by, was fifteen feet from the ground behind a loose piece of bark on an old rotten fir stub at the side of the road through the fir and spruce woods (6,500 feet).

EASTERN WINTER WREN, *Nannus hiemalis hiemalis*.—Breeding abundantly in the thick fir and spruce woods at the top of the mountain this hardy little bird lingers in the fall until winter blizzards force it to a lower altitude. The first hint of milder weather sees its reappearance, so for ten months out of the average year it can be found on the higher ridges. Exceptional winters will influence its movements to a certain extent, but it can invariably be seen on Mt. Mitchell from the latter part of March until the middle of November, and has been recorded there as early as February 6, 1931, and as late as December 6, 1932. A nest found May 16, 1930, held four fresh eggs, and was well concealed in the upturned roots of a wind-thrown fir in the cut-over area (6,300 feet).

CAROLINA WREN, *Thryothorus ludovicianus ludovicianus*.—Of casual occurrence during the summer months in the fir and spruce woods at the top of the mountain, being recorded there July 30 and August 6, 1930, and July 20 and August 2, 1932.

CATBIRD, *Dumetella carolinensis*.—This species breeds sparingly in the cut-over area to an altitude of approximately 6,000 feet; extreme dates for its occurrence there are May 4, 1933, and September 30, 1930.

BROWN THRASHER, *Toxostoma rufum*.—Of casual occurrence in the cut-over area where it possibly breeds; noted during the summer months to an altitude of approximately 6,200 feet. The earliest date for its arrival in the spring (6,000 feet) is April 30, 1931.

SOUTHERN ROBIN, *Turdus migratorius achrusterus*.—A fairly plentiful breeding bird in the fir and spruce woods at the top of the mountain where, to one familiar with this species about the lawns in towns and cities, it seems at first rather out of place. Its arrival in the spring is influenced to a certain extent by the weather, and while it invariably appears by the latter part of March a relatively mild winter, as in 1933-34, has seen its return as early as March 8. It is rarely observed after the last brood of young are fully grown, the one exception being a flock of twenty birds noted October 28, 1932. It is possible that two broods are reared for a nest found June 3, 1930, held three well-incubated eggs, while on August 10, 1931, young barely able to fly were seen being fed by the two adult birds. There are no records for the occurrence of the northern race here, all specimens taken both in the spring and in the fall being clearly referable to *T. m. achrusterus*.

WOOD THRUSH, *Hylocichla mustelina*.—One pair of these birds noted June 6, 1930, in the open spruce woods at an altitude of approximately 5,000 feet marks the extreme limit here which this species reaches during the summer months.

EASTERN HERMIT THRUSH, *Hylocichla guttata faxonii*.—One record, a single bird seen October 13, 1930, in the cut-over area (6,000 feet).

OLIVE-BACKED THRUSH, *Hylocichla ustulata swainsoni*.—A fairly plentiful fall transient both in the cut-over area and in the thick fir and spruce woods. Extreme dates for occurrence then are September 11 (1932) (6,000 feet) and October 7 (1930) (6,500 feet). The only record for the spring migration is of a single bird seen May 11, 1934 (6,500 feet).

GRAY-CHEEKED THRUSH, *Hylocichla minima aliciae*.—One record: two birds seen September 21, 1932, in the cut-over area (6,000 feet).

VEERY, *Hylocichla fuscescens fuscescens*.—A fairly plentiful breeding bird in the cut-over area to an altitude of approximately 6,000 feet, but of casual occurrence only in the thick fir and spruce woods at the top of the mountain. Extreme dates for its occurrence are April 27 (1934) (5,200 feet) and September 12 (1930) (6,000 feet). A nest found June 6, 1930, held two fresh eggs and was a foot from the ground in brush lying at the edge of a thicket in open spruce woods (5,000 feet).

EASTERN BLUEBIRD, *Sialia sialis sialis*.—Fairly plentiful during the early-spring months in the cut-over area (6,000 feet), occurring then in small scattered flocks. Extreme dates of occurrence are February 20 (1931) and March 21 (1930). It may possibly breed sparingly at this altitude, although there are no actual records. It has been seen but once in the fall: two birds flying by overhead over the top of the mountain October 28, 1932.

EASTERN GOLDEN-CROWNED KINGLET, *Regulus satrapa satrapa*.—One of the characteristic birds of the spruce and fir woods at the top of the mountain, and observed there throughout the year. It is apparently a remarkably hardy species for despite the severest weather small flocks of these diminutive birds were seen throughout the winter months, varying little in numbers from year to year. By the middle of April mated pairs, the males singing, have been noted, but actual nesting does not take place until early June, and it is July before the first broods of young are seen.

EASTERN RUBY-CROWNED KINGLET, *Corthylio calendula calendula*.—A common fall transient both in the cut-over area and in the thick fir and spruce woods at the top of the mountain; extreme dates for occurrence then are September 11 (1932) (6,300 feet) and October 27 (1931) (6,600 feet). Observed but twice in the spring: two birds April 19, 1930 (6,500 feet) and a single bird May 4, 1933 (6,500 feet).

CEDAR WAXWING, *Bombycilla cedrorum*.—It is early June before this species appears in the cut-over area (6,000 feet), and fully a month later before scattered pairs are seen in the fir and spruce woods at the top of the mountain. That it breeds there, at least sparingly, is evidenced by a pair seen August 10, 1931, gathering nesting material at the edge of a small clearing (6,600 feet). The only record for the fall months is a flock of possibly forty of these birds seen October 27, 1931 (6,200 feet).

MOUNTAIN VIREO, *Vireo solitarius alticola*.—A fairly plentiful breeding bird in the fir and spruce woods at the top of the mountain. In the valleys the first spring migrants appear during the latter part of March, but April 12 (1930) is the earliest that this species has been noted in the open spruce woods (5,000 feet), and not until May 4 (1933) has the first venturesome individual been seen at the top of the mountain (6,600 feet). The latest date for occurrence in the fall is September 30 (1930).

RED-EYED VIREO, *Vireo olivaceus*.—One record, two birds seen September 11, 1932, one in the cut-over area (6,000 feet), the other in the thick fir and spruce woods (6,500 feet) feeding with a restless flock of warblers.

BLACK AND WHITE WARBLER, *Mniotilta varia*.—Plentiful during the late summer in the thick fir and spruce woods at the top of the mountain, appearing with unfailing regularity in July and lingering until September. Extreme dates for occurrence then are July 18 (1931) and September 12 (1930). Not known to breed above an altitude of approximately 3,000 feet.

GOLDEN-WINGED WARBLER, *Vermivora chrysoptera*.—One record, a single bird seen September 3, 1930, in the cut-over area (6,000 feet).

TENNESSEE WARBLER, *Vermivora peregrina*.—A plentiful fall transient both in the cut-over area and in the thick fir and spruce woods at the top of the mountain, where small restless flocks are seen throughout all of September. Extreme dates for occurrence are September 1 (1932) (6,500 feet) and October 1 (1931) (6,600 feet).

MAGNOLIA WARBLER, *Dendroica magnolia*.—A fairly plentiful fall transient in the thick fir and spruce woods at the top of the mountain; extreme dates for occurrence then are September 3 (1930) and October 1 (1931) (6,600 feet).

CAPE MAY WARBLER, *Dendroica tigrina*.—A rather scarce transient in the thick fir and spruce woods at the top of the mountain, where it has been noted but four times. The one record for the spring migration is a male seen May 4, 1933, while in the fall it has been recorded September 30, 1932, and September 14 and 15, 1933.

BLACK-THROATED BLUE WARBLER, *Dendroica caerulescens caerulescens*.—Although possibly more plentiful than actual records would indicate, this northern race has but twice been found in the fir and spruce woods at the top of the mountain. Two females taken September 1 and October 7, 1932, are clearly referable to this form.

CAIRNS'S WARBLER, *Dendroica caerulescens cairnsi*.—A plentiful breeding bird in the cut-over area to an altitude of approximately 6,000 feet. During the latter part of July young of the year appear in the fir and spruce woods at the top of the mountain, and this species can be found there then until early October. Its hardiness is evidenced by a female seen October 7, 1932 (6,600 feet) when the temperature registered 19 degrees F., and there was a light snow on the ground. Extreme dates for occurrence are April 26 (1930) and October 13 (1930).

MYRTLE WARBLER, *Dendroica coronata*.—Although an abundant transient in the valleys, this species is rarely found on the mountain-sides, and there are but two

records for its occurrence in the fir and spruce woods at the top of the mountain. Three birds were seen there September 30, 1932, and two October 18, 1933.

BLACK-THROATED GREEN WARBLER, *Dendroica virens virens*.—A plentiful breeding bird in the thick fir and spruce woods at the top of the mountain, appearing in April when the ground is frequently still covered with snow and lingering in the fall until early October. Extreme dates for occurrence are April 17 (1931) and October 7 (1930). Two broods may at times be raised for a female was seen gathering nesting material May 23 (1934), and on August 15 (1932) a male was watched as it fed a young bird out of the nest but a day or so and as yet barely able to fly.

BLACKBURNIAN WARBLER, *Dendroica fusca*.—Although not known to breed above an altitude of approximately 5,000 feet, this species is fairly plentiful during the late summer in the fir and spruce woods at the top of the mountain, appearing regularly in July and lingering through September. Extreme dates for occurrence then are July 30 (1930) and September 30 (1932).

CHESTNUT-SIDED WARBLER, *Dendroica pensylvanica*.—A plentiful breeding bird in the cut-over area to an altitude of approximately 6,300 feet, and of casual occurrence during the late-summer months in the fir and spruce woods at the top of the mountain. Extreme dates for occurrence are May 2 (1930) and September 18 (1930).

BAY-BREASTED WARBLER, *Dendroica castanea*.—A somewhat scarce but regular fall transient in the fir and spruce woods at the top of the mountain. Extreme dates for occurrence then are September 12 (1930) and October 7 (1930).

NORTHERN PINE WARBLER, *Dendroica pinus pinus*.—While this species does not breed above an altitude of approximately 2,500 feet, it can be found regularly, though in small numbers, in the fir and spruce woods at the top of the mountain during the late summer. Extreme dates for occurrence then are July 30 (1930) and September 18 (1930).

NORTHERN PRAIRIE WARBLER, *Dendroica discolor discolor*.—Noted but twice in the cut-over area; single birds were seen August 6, 1930 (6,000 feet) and September 11, 1932 (6,300 feet).

WESTERN PALM WARBLER, *Dendroica palmarum palmarum*.—Likewise noted but twice in the cut-over area (6,200 feet); four birds were seen September 18, 1930, and a single bird September 11, 1932.

OVEN-BIRD, *Seiurus aurocapillus*.—A fairly plentiful fall transient in the thick fir and spruce woods at the top of the mountain; extreme dates for occurrence then are September 1 (1932) and October 7 (1930). Not known to breed above an altitude of approximately 4,500 feet.

MARYLAND YELLOW-THROAT, *Geothlypis trichas trichas*.—Of casual occurrence during the fall months in the cut-over area; extreme dates for occurrence there are August 20 (1930) (5,000 feet) and September 24 (1931) (6,000 feet).

NORTHERN YELLOW-THROAT, *Geothlypis trichas brachidactyla*.—One record, a male taken October 13, 1930, in the cut-over area (6,300 feet).

YELLOW-BREASTED CHAT, *Icteria virens virens*.—A singing male noted May 8, 1930, in the cut-over area at an altitude of approximately 5,000 feet marks the extreme limit to which this species ventures during the summer months.

HOODED WARBLER, *Wilsonia citrina*.—Of casual occurrence in the cut-over area during the late summer and early fall. Three birds were seen there August 6, 1930 (6,000 feet); a male September 12, 1930 (6,300 feet); and another male September 30, 1932 (6,300 feet). A dead bird, an adult male, was also found on a

trail in the fir and spruce woods at the top of the mountain (6,650 feet) on October 18, 1930.

CANADA WARBLER, *Wilsonia canadensis*.—A plentiful breeding bird in the cut-over area to an altitude of approximately 6,300 feet, appearing early in May and lingering until the first of September. Not known to nest in the fir and spruce woods at the top of the mountain until the year 1934 when two pairs were found there May 23. Extreme dates for occurrence are May 2 (1930) and September 3 (1930).

AMERICAN REDSTART, *Setophaga ruticilla*.—This is another species that ventures to the tops of the higher ridges during the late summer, appearing with unfailing regularity in the thick fir and spruce woods (6,500 feet) in August and lingering until early October. Extreme dates for occurrence then are August 16 (1931) and October 7 (1930). Not known to breed above an altitude of approximately 2,300 feet.

EASTERN MEADOWLARK, *Sturnella magna magna*.—Of casual occurrence in the cut-over area to an altitude of approximately 6,200 feet; it was noted there April 2, 1930; May 16, 1930; March 19, 1931; and October 21, 1932.

EASTERN RED-WING, *Agelaius phoeniceus phoeniceus*.—One record, a male seen March 21, 1932, feeding with a flock of Robins in the cut-over area (5,200 feet).

RUSTY BLACKBIRD, *Euphagus carolinus*.—One record, three birds seen November 3, 1930, in the cut-over area (5,400 feet).

ROSE-BREADED GROSBEAK, *Hedymeles ludovicianus*.—Although a plentiful breeding bird on the mountain-sides to an altitude of approximately 4,800 feet, this species is of but casual occurrence during the late summer in the fir and spruce woods (6,500 feet). Extreme dates for the occurrence then of small flocks of fully grown young are August 2 (1932) and August 27 (1930).

INDIGO BUNTING, *Passerina cyanea*.—Appearing with unfailing regularity in the fir and spruce woods (6,500 feet) in early July, this species is unique in that throughout the month only adult males are seen, singing each day from the upper branches of the larger trees. At no time have females or young of the year been noted above an altitude of 5,000 feet. Extreme dates for the occurrence of these wandering males at the top of the mountain are July 5 (1931) and July 31 (1934).

EASTERN PURPLE FINCH, *Carpodacus purpureus purpureus*.—One record, a single bird seen January 24, 1930, singing from the upper branches of a tall fir near the top of the mountain (6,500 feet).

NORTHERN PINE SISKIN, *Spinus pinus pinus*.—Plentiful in the fir and spruce woods at the top of the mountain from late January through the latter part of April 1930, but rarely observed since then. That it breeds at least sparingly is evidenced by two birds seen June 4, 1930, and a single bird August 16, 1931, flying by overhead.

EASTERN GOLDFINCH, *Spinus tristis tristis*.—Fairly plentiful during the summer months in the cut-over area to an altitude of approximately 6,200 feet, and of casual occurrence then about clearings in the fir and spruce woods at the top of the mountain. A late nest found September 1, 1932, held four slightly incubated eggs, and was six feet from the ground in a yellow-birch sapling (5,800 feet). It was rather loosely built of shreds of bark and gray plant fibers, lined with fine moss-stems and a few horse-hairs.

RED CROSSBILL, *Loxia curvirostra pusilla*.—Although this species unquestionably breeds here at a lower altitude it has been rarely observed near the top of the mountain. A flock of possibly thirty birds, some of them in streaked juvenal

plumage, seen June 6, 1930 (5,200 feet), a single bird August 27, 1930 (6,200 feet), and two birds September 4, 1931 (5,200 feet), are the only records for this five-year period.

BENDIRE'S CROSSBILL, *Loxia curvirostra bendirei*.—One record, two birds, both adult males, found October 21, 1932, in the fir and spruce woods at the top of the mountain (6,500 feet). Their appearance, as they fed in the upper branches of one of the larger trees, at once aroused a suspicion as to their identity, and one that was taken then proved clearly referable to this Rocky Mountain race.

RED-EYED TOWHEE, *Pipilo erythrophthalmus erythrophthalmus*.—A fairly plentiful breeding bird in the cut-over area to an altitude of approximately 6,300 feet, extreme dates for occurrence there being April 30 (1931) (6,000 feet) and October 21 (1932) (6,200 feet). It possibly winters sparingly, for a male was seen February 6, 1931, in a spruce thicket in open woods (5,200 feet).

EASTERN SAVANNAH SPARROW, *Passerculus sandwichensis savanna*.—One record, a single bird seen October 21, 1932, feeding at the side of an old logging-road in the cut-over area (5,600 feet).

EASTERN VESPER SPARROW, *Poocetes gramineus gramineus*.—Of casual occurrence in the cut-over area both in the spring and in the fall. Small flocks noted April 2, 1930 (5,200 feet), April 9, 1931 (5,600 feet), and October 21, 1932 (5,700 feet).

SLATE-COLORED JUNCO, *Junco hyemalis hyemalis*.—Fairly plentiful during the late-fall and early-winter months both in the cut-over area and in the fir and spruce woods at the top of the mountain; small flocks linger during mild winters from the latter part of October until January. Earliest date of arrival in the fall, October 28, 1932 (6,000 feet). A small flock seen, and a male taken, January 24, 1930 (6,000 feet).

CAROLINA JUNCO, *Junco hyemalis carolinensis*.—This is undoubtedly the commonest and most characteristic bird of the higher ridges in the southern Appalachians. Contrary to general opinion it is practically resident, and while less abundant during the winter months can be found then, despite the most severe weather, in the spruce and fir woods at the top of Mt. Mitchell. On December 23, 1930, the ground there was covered with a foot of snow, the temperature early that morning registered zero, and a blizzard raged throughout the day, yet small flocks of these birds were seen at frequent intervals feeding contentedly in the shelter of fir thickets. Although by the latter part of February or early March males can be heard singing and mating activities are indulged in, it is early May before a serious attempt is made to rear young. Two broods, possibly three, are raised each year; extreme dates at which nests with four, rarely three, fresh eggs have been found are May 16 (1930) (6,500 feet) and August 2 (1932) (6,600 feet). There is the usual irregularity as to the time when individual pairs nest so nests with fresh eggs can be found at almost any time between these two dates. They are invariably well concealed, and are placed in the upturned roots of a wind-thrown tree, in the side of a low bank, or sunken flush with the ground at the edge of a clearing. In construction they vary little, being built of fine twigs, green moss, rootlets and grasses, well cupped and lined with fine grasses and moss-stems. By the latter part of July broods of fully fledged young are numerous, and are usually seen then feeding well off the ground in the outer branches of the larger trees. A careful check on the distribution of this species on May 7, 1931, showed it to be breeding from the very top of the mountain to an altitude of approximately 3,000 feet, but scarce below 4,200 feet.

EASTERN FIELD SPARROW, *Spizella pusilla pusilla*.—Although fairly plentiful during the summer months in the cut-over area to an altitude of approximately 5,200 feet, this species rarely ventures any higher, and only once has been recorded in the fir and spruce woods at the top of the mountain. A single bird was seen at the edge of a clearing there (6,500 feet) on October 27, 1931. Extreme dates for occurrence at 5,200 feet are March 8 (1934) and November 3 (1930).

WHITE-CROWNED SPARROW, *Zonotrichia leucophrys leucophrys*.—Of casual occurrence during the late-fall months in the cut-over area to an altitude of approximately 6,200 feet; extreme dates for occurrence then are October 13 (1930) and November 11 (1930).

WHITE-THROATED SPARROW, *Zonotrichia albicollis*.—Plentiful during the late-fall months in the cut-over area to an altitude of approximately 6,300 feet; extreme dates for the occurrence then of small flocks are October 13 (1930) and November 24 (1930). But two records for the spring migration: a male seen April 24, 1931 (6,200 feet), and a small flock of three birds May 4, 1933 (6,300 feet).

EASTERN FOX SPARROW, *Passerella iliaca iliaca*.—Fairly plentiful during the late-fall months in the cut-over area to an altitude of approximately 6,200 feet, lingering there until the first heavy snowfall. Extreme dates of occurrence then are October 18 (1933) and December 11 (1930). Less plentiful during the spring migration but observed then in small numbers from February 6 (1931) through March 8 (1934).

SWAMP SPARROW, *Melospiza georgiana*.—Two records of single birds seen April 30, 1931, in the fir and spruce woods at the top of the mountain (6,500 feet), and November 6, 1932, in the cut-over area (6,300 feet).

SONG SPARROW, *Melospiza melodia*.—A plentiful breeding bird in the cut-over area, and observed during the summer months to the very edge of the thick fir and spruce woods (6,300 feet). Its appearance in the spring is markedly influenced by the weather, and while a few hardy individuals have been seen in late February it is the latter part of March before this species is present in any numbers. In the fall it lingers through October, and when mild weather prevails has been infrequently recorded in November. Extreme dates for its occurrence are February 25 (1930) and November 3 (1930).

U. S. Fish and Wildlife Service
Gulfport, Mississippi

SECOND-YEAR PLUMAGE OF THE GOSHAWK

BY RICHARD M. BOND AND ROBERT M. STABLER

Plates 11, 12

THERE are in the recent literature a number of rather contradictory statements about the first adult plumage of the American Goshawk, *Accipiter atricapillus atricapillus*. Swarth (1926: 104) states: "One specimen . . . (No. 44729), a male in adult plumage, almost fully acquired . . . is of interest in view of the argument advanced by Taverner . . . that the goshawk molts from the streaked juvenal plumage into a coarsely barred stage . . . and later into the more finely barred plumage that is considered to be typical of the subspecies *atricapillus*."

" . . . This bird is pale colored and finely barred. . . . Some of the breast feathers have rather broad mesial streaks but it is otherwise just like other specimens of *atricapillus* at hand. . . .

"The specimen just described (as well as another similar bird collected by Brooks) shows that differences of coarse or fine markings cannot be explained as different stages reached by the same individual."

Brooks (1927: 113), in commenting on the foregoing, says: "I entirely agree with Taverner that the heavily barred and striated adult plumage of the Goshawks is only one of age and is acquired the second year, the markings getting finer and more uniform with each successive year. This heavily marked stage may not be universal . . . but that it does exist in a large proportion of cases is evident to anyone who has examined many Goshawks. . . . I have not seen the specimen [discussed by Swarth] . . . but the other 'similar bird collected by Brooks' distinctly supports Taverner's theory, as does another light-colored adult taken at Atlin which Swarth has forgotten."

It would be interesting to know what evidence Major Brooks has found to indicate that the markings become "finer and more uniform with each successive year" after the third year. Taverner (1940: 157), in his most recent comment on the subject, writes: "Further investigation indicates that this fineness of pattern is an age, not a racial character. In a series of 53 adult specimens taken across the continent, a number are changing from striped juvenal to gray adult plumage . . . In every such transitional plumage, . . . the . . . new gray pattern is of the coarsely vermiculated type and no finely vermiculated specimen that the writer has seen shows any trace of striped juvenal feathers."

According to our evidence, Bent (1937: 130) seems to come closest to the facts when he says: "The second-year plumage is much like that of the adult, but the crown is streaked with white and the breast is heavily marked with broad shaft streaks and transverse bars or spots of brownish black."

We have some additional data to offer on the subject. First, one of us (Stabler) has kept a female Goshawk, taken as a nestling, in captivity for four years, and photographs of the bird in its first and third adult plumages are presented. This Goshawk came from a nest in the Pocono Mountains in northern Pennsylvania. It hatched about June 1, 1936. Plate 11, fig. 1a, is a photograph taken in the fall of 1937; fig. 1b shows the same bird in the spring of 1940, just before it had lost its third adult plumage. In the first photograph, several unmolted, dark juvenile upper wing-coverts can be seen, and the presence of these seems a much better criterion of the first adult plumage than the juvenile breast-feathers apparently used by Taverner, since the molt of the under parts is often complete as in this case. The pattern and color of the belly, flanks and thighs were identical both years, but the breast the first year had wider shaft streaks and wider cross-bars. Both these wider markings, however, were conspicuously more dilute and browner than they were the following year. This bears out Bent's statement quoted above. The white streaking of the crown was not observed to be noticeably different, however.

We feel that the evidence presented by this bird outweighs a very large number of museum skins, which can be observed at only one stage in their plumage. However, we have examined the skins in the Museum of Vertebrate Zoölogy, Berkeley, California. There are twenty-six Goshawk skins in this collection, either adult or molting into the adult plumage, and of these, six represent the first post-juvenal plumage, as shown by the presence of juvenile coverts. There is marked variation in pattern, both in this group and among the old adults. Some of these are shown in Pls. 11, 12, figs. 2, 3. Of the entire twenty-six, the *lightest* bird below was an old adult, no. 27136 ♂, Mendocino County, California, November 22, 1916; the next lightest was no. 52031 ♂, Roseau County, Minnesota, a *first-year adult*, without unduly wide shaft streaks or bars on the breast. The *darkest* bird below was no. 62354 ♀, Yuba County, California, November 9, 1932, an *old adult*. It was difficult to pick out the next-darkest specimen from among four skins from California, of which only two were first-year adults.

The lightest bird in the series (no. 27136 ♂) is also that with the finest vermiculations, but the bird with the widest and most regular

cross-bars is far from the darkest. This bird, an *old adult*, no. 52032 ♀, Roseau County, Minnesota, October 20, 1937, is nearly equalled in this respect by another bird, no. 70385 ♀ (not shown here), an old adult from Cumberland County, Pennsylvania, November 30, 1935. These two birds most closely resemble specimens of *A. gentilis gentilis* from Finland (no. 72438 ♀) and the pattern on belly and thighs (though the cross-bars are narrower, less regular, and darker) approaches that of the European birds reasonably closely. The breast pattern, however, is very different, as is shown in Plate 11, fig. 2 and Plate 12, fig. 4.

Taverner (1940: 158, 159) mentions a female from the Mackenzie delta, which "... is very coarsely marked below, with vermiculations broadened almost to regular bars that approach those of the European *A. gentilis*. The shaft streaking is very heavy and general appearance is typical of the dark Queen Charlotte and Vancouver island phase." We have not seen specimens from the British Columbia islands.

CONCLUSIONS

On the basis of the material available to us, we conclude:

1. There is some tendency for first-year adult American Goshawks to have wider, browner cross-bars and heavier shaft streaks on the *breast-feathers* than in subsequent plumages; we have seen no evidence that the pattern of the rest of the under parts varies appreciably with age.
2. The general tone of the under parts (whether light or dark) does not depend directly on the width or regularity (approach to *A. gentilis*) of the individual bars.
3. Individual variation in adults of the American Goshawk is much greater than age variation, and probably greater than racial variation, as defined either by Ridgway (1874) or Taverner (1940). This means that allocation of individual specimens on other than geographical grounds is of doubtful validity.

We are in entire agreement with Peters (1931: 205) in synonymizing *Astur* with *Accipiter*; and with Taverner (1940), Friedmann (MS.) and others, in synonymizing the race *striatulus* with *atricapillus*. We have not seen among about 100 specimens of Old World Goshawks and a slightly larger number of American Goshawks a single specimen from either group that could be mistaken as to its continental origin, and hence are not ready to agree with Peters (*loc. cit.*) as to the proper name for the American species, which we conclude should be *Accipiter atricapillus* (Wilson).

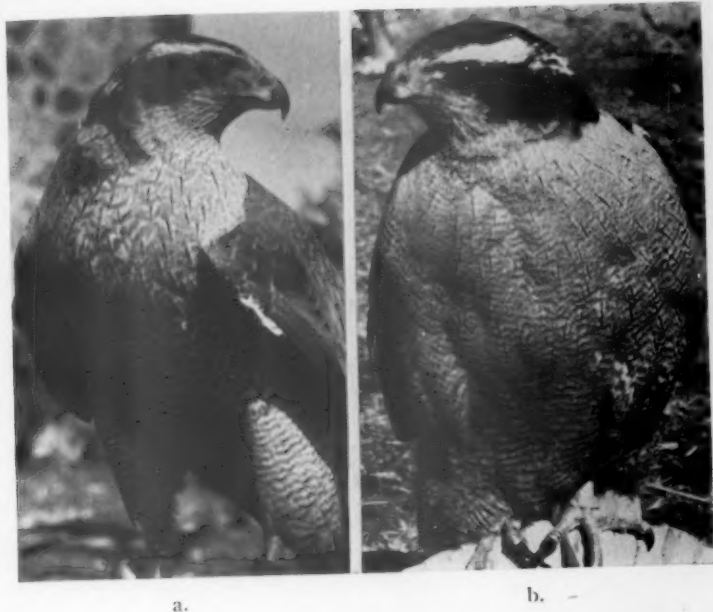


FIG. 1. FIRST AND THIRD ADULT PLUMAGES OF GOSHAWK



52032 ♀

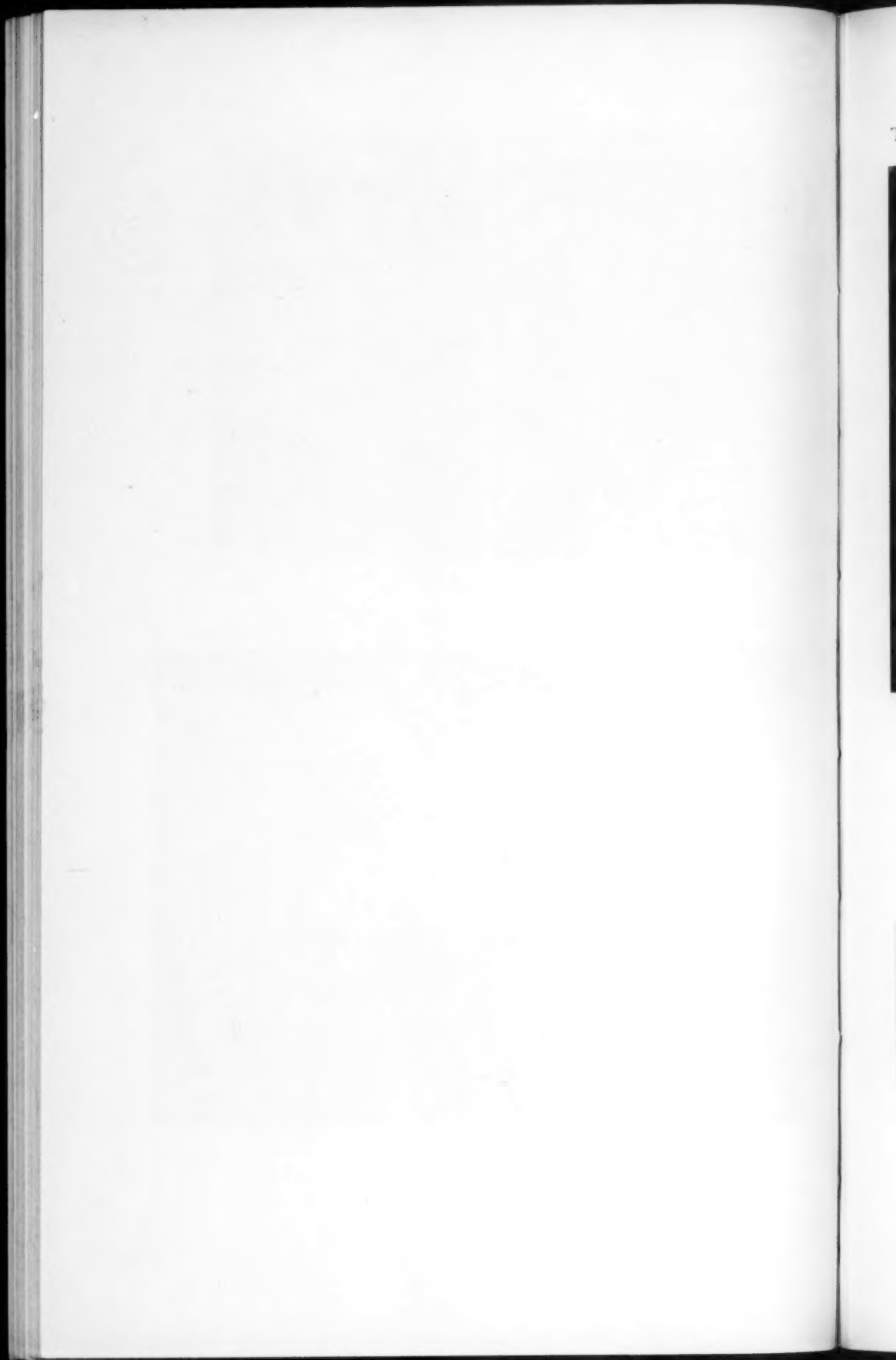
72138 ♀

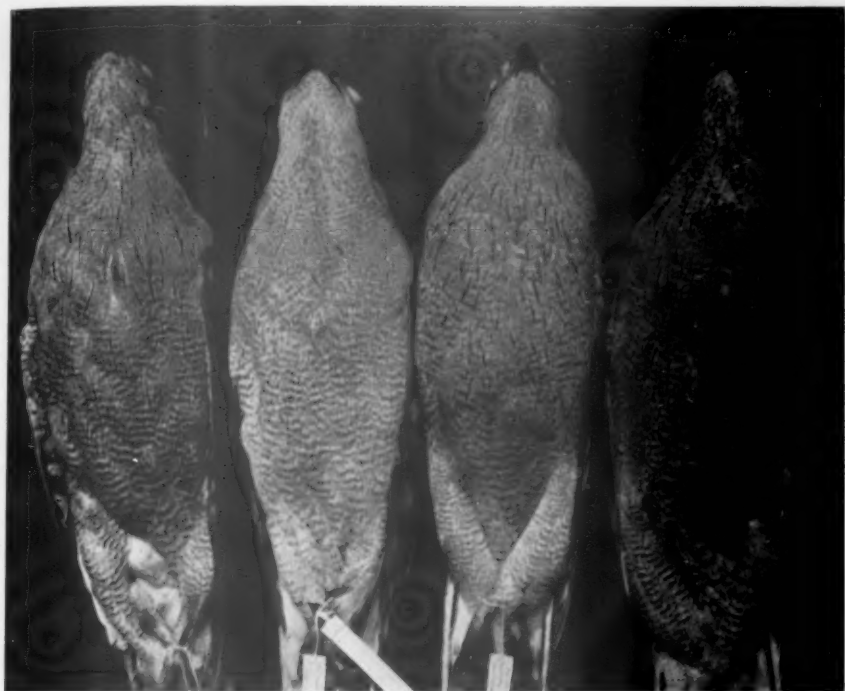
62351 ♀

27136 ♂

FIG. 2. VARIATION IN GOSHAWKS OF OLD AND NEW WORLDS







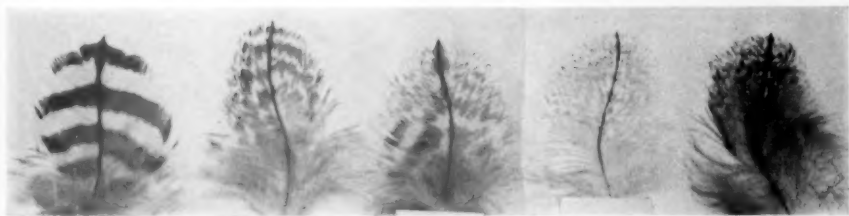
17306 ♂

52031 ♂

44729 ♂

72540 ♀

FIG. 3



72438 ♀

52032 ♀

44729 ♂

27136 ♂

62354 ♀

FIG. 4

VARIATION IN GOSHAWK PLUMAGE

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LITERATURE CITED

BENT, A. C.

1937. Life histories of North American Birds of Prey. Order Falconiformes (Part 1). Bull. U. S. Nat. Mus., no. 167: i-viii, 1-409.

BROOKS, A.

1927. Notes on Swarth's report on a collection of birds and mammals from the Atlin region. Condor, 29: 112-114.

PETERS, J. L.

1931. Check-list of birds of the world. Vol. 1, pp. i-xviii, 1-345. Harvard Univ. Press, Cambridge.

RIDGWAY, R. (in Baird, S. F., Brewer, T. M., and Ridgway, R.)

1874. History North American birds, 3: 238-240. Little, Brown & Co., Boston.

SWARTH, H. S.

1926. Report on a collection of birds and mammals from the Atlin region, northern British Columbia. Univ. California Publ. Zool., 30: 51-162.

TAVERNER, P. A.

1940. Variation in the American Goshawk. Condor, 42: 157-160.

EXPLANATION OF PLATES

PLATE 11

Fig. 1.—Goshawk from the Pocono Mountains, Pennsylvania. *a*, first adult plumage; *b*, third adult plumage.

Fig. 2.—Goshawk skins in the Museum of Vertebrate Zoölogy. Left to right: American Goshawk most like European species; European Goshawk from Sibbo, Skyttaskas, Finland; the darkest American Goshawk in the collection; the lightest American Goshawk in the collection.

PLATE 12

Fig. 3.—Left to right: "average" first-year adult; the lightest first-year adult; Swarth's first-year adult from Atlin, British Columbia; "average" old adult (Yuba County, California) with much heavier shaft streaks than those of lightest first-year adult.

Fig. 4.—Feathers from right side of breast (upper part of sternal tract), left to right: European Goshawk; American Goshawk most like European form; Swarth's first-year adult from Atlin; lightest old adult; darkest old adult.

Soil Conservation Service

Berkeley, California

and

University of Pennsylvania

Philadelphia, Pennsylvania

REPAIRED BONE INJURIES IN BIRDS

BY OTTO W. TIEMEIER

Plates 13, 14

THE extent and severity of bone injury which a wild animal may sustain and survive is a matter of considerable speculative interest. This is especially true of birds because disability often forces them into an unnatural habitat where they must contrive not only to escape their enemies, but to secure sufficient food as well.

The period of comparatively helpless convalescence is often long—indeed, it is remarkable that so many cripples survive. Roggemann ('*Untersuchungen über die Heilung von Knochenbrücken bei Vögeln*', *Zeitschr. f. Wiss. Zool.*, 137: 627–686, 1930), working with pigeons and canaries, found that specimens injured in the laboratory, by having a wing or a leg broken, were still partly incapacitated after a convalescence of three weeks. Roggemann observed that though injured domestic pigeons attempted to use their wings after a period of a week, a lapse of three weeks was generally required for the fracture to knit and heal sufficiently to permit ordinary flight.

The length of the convalescent period depends considerably upon the temperament of the bird. Roggemann (l. c.) says that if the animal remains relatively inactive the period is much shorter. For example, he writes that an excitable individual accomplished no more mending of a fractured tarso-metatarsus in twenty-three days than a less active one (undergoing the same laboratory treatment) in sixteen days. He also states that the mending of a fracture of the ulna and radius requires as much time as that of the humerus.

Roggemann further observed that the appetite and food requirements of the birds did not diminish noticeably during the mending of the fracture. Whether this would be true of wild animals in a convalescent state is a matter of conjecture. While it is certain that they would have to obtain some food, it is possible that their requirements would be less if they remained relatively inactive for a long period. We must bear in mind that Roggemann's birds were in a controlled environment. The matter of survival of wild birds must be much more variable. For instance, how can a Ferruginous Rough-leg, whose diet consists largely of rabbits and ground squirrels, secure its food while it is disabled by a fractured femur? Yet this has occurred. This individual, entirely dependent upon the large femora for the force necessary to seize and hold its prey, nevertheless managed

to support its weight on the uninjured member, and to use the same member in grasping prey, with the help of its great wings, until the fractured 'thigh bone' had become sound again. I have observed among the birds of prey, twenty-nine hawks and owls that have sustained major fracture of either leg or wing, and must have been incapacitated for three to four weeks at least. In spite of this handicap, and the retarding effect of motion on the process of healing, these birds somehow managed to elude their enemies and to secure sufficient food to tide them over that long period of hazards.

It is the purpose of this paper to present a survey of the repaired bone injuries of birds, with tabulations as to the location, the specific bones involved, the injuries which appear to be peculiar to certain groups, and to ascertain the probable cause of injuries, and, if possible, to suggest correlation of the injury with the habits of the bird.

The scientific designations that have been used are those of the A. O. U. 'Check-list,' 4th edition.

I wish to thank Mr. C. D. Bunker, Assistant Curator in Charge of the Museum of Birds and Mammals, who made available to me the fine skeletal collection in his care and has given me the opportunity to complete this work. To Dr. H. H. Lane, Head of the Department of Zoology, University of Kansas, under whose direction the problem was taken, I am indebted for helpful suggestions and criticisms.

A total of 6,212 specimens in the collections of the University of Kansas Museum of Birds and Mammals has been carefully examined and the data checked. Of this number 4.50 per cent or 280 specimens show unmistakable evidence of repaired bone injury. This is a rather high percentage considering the fact that many of these injuries are of such a serious nature as to reduce the victims' chances of survival almost to the vanishing point. Yet they managed to overcome these odds and lived to be collected for museum specimens.

Of the great numbers of birds which sustain fatal injuries throughout any given period of time, none would normally ever reach the museum, the exception being birds collected by a museum party. This fact makes the data even more significant as the number which naturally succumb must be very much higher.

Skeletal examinations were made of 3,111 male birds, 2,371 females, and 730 birds of undetermined sex. Of the 3,111 male bird skeletons examined, 150 or 4.82 per cent showed repaired bone injuries; of the 2,371 females, 112 or 4.71 per cent; and of the 730 specimens of undetermined sex, 18 or 2.46 per cent showed repaired bone. The slightly higher average in males over the females may be attributed to the fact that the males are, generally speaking, more conspicuously

colored than the females and would be the first to attract the attention of man and receive injuries in that manner. This would seem to be particularly true in the birds injured by shot as illustrated by the family Anatidae in which five of the seven specimens that were shot were males. The much lower percentage of injuries in the birds of undetermined sex can be explained by the fact that the majority of these birds were young or immature specimens. We may safely assume that injured immature birds would be much less likely to survive, hence such individuals would have succumbed before falling prey to collectors.

There is a great variation in the severity of the injuries that the birds suffered. The specific bone injuries range from a broken toe to a fractured skull. Even the pubic bone has come in for its share. In fact nearly every bone except some of the single elements of the skull has been injured and repaired.

There have not been as many types of injuries as might be supposed. Most of the injuries may definitely be termed fractures. Some of the injuries have been caused by shot and in that event have not been termed fractures unless there was definite separation of the two ends of the injured part. Pathological conditions other than injuries were very few. In specimen K. U. 20490, *Struthio camelus*, which was a zoological-garden specimen, some of the vertebrae appear to have been osteomyelitic, though this is not definitely established. None of the remaining cases could positively be termed other than the direct result of the bone injury.

The injuries were tabulated according to the sex of the bird to ascertain any significant difference in injuries in the two sexes. The survey shows that there is not a great difference between the two and that the one has suffered as many and as severe injuries as the other. By counting the injuries it is noticed that the males received 203 injuries and the females 157. Comparing these with the number of specimens of each sex, 3,111 males and 2,371 females, it is seen that the percentage is 0.09 per cent greater in females.

Many people have doubtless wondered why a bird turns to the right or left when it appears that the opposite direction would be the better move. The injuries appear as severe and as numerous on the left side of birds as on the right. By tabulating those on one side and comparing them with those on the other it will be seen that they are identical, 163 on each side (injuries in the median line have not been entered in this tabulation). This seems to indicate that a bird does not favor one side over the other and so can definitely not be either 'right-' or 'left-handed'.

The bones that have been injured the greatest number of times are the clavicles. (The terms right and left clavicles instead of the term furcula, which includes the two bones, have been used to insure specificity.) The right clavicle has been injured and repaired 66 times while the left has received 63 injuries. This makes a total of 129 injuries to the two. In 21 instances both the right and the left had been injured. There are several interesting facts brought out by the study of clavicular injuries. Perhaps the most interesting fact is that 99 of the 129 occurred in the passeriform birds. Clavicle injuries, along with those of the scapula and sternum, include nearly all the injuries present in that group of birds. Most of the skeletons in the collection except those of the Corvidae—crows and jays—are those of rather small birds. Of the 3,809 passeriform skeletons 130 or 3.41 per cent show mended injuries. This is 1.09 per cent less than the average for the entire collection and would indicate that the smaller birds receive less injuries or succumb more often to their injuries than the larger ones and that the chances are nearly 3 to 1 that the injury will be of one of the clavicles.

There are several reasons why the smaller birds injure the clavicles. If one watches a small bird which has flown into a building and is attempting to find an exit, he will notice that it flies against a window pane with almost enough force to break the glass, and that the force of the impact is usually borne by the bird's thoracic region. That impact or one received in a similar manner might easily cause a fracture of the clavicles. We know when birds are migrating during a fog, or when they are attracted to a light at night, that they often fly into objects. A great number probably injure themselves in this way. In the pursuit of ordinary activities a bird might also sustain an injury to the clavicles. I have seen Meadowlarks fly into a fence. If one is observing in the woods at night, he may, by frightening a number of birds in a tree, see them flying into branches and other obstacles in the rush to get into the open.

The scapulae rank next to the clavicles in the frequency of injuries. The right scapula was injured and repaired 17 times and the left 16, making a total of 33. All the injuries were fractures and a large number had been incurred probably as a result of attack. The scapulae are situated in a rather vulnerable position in birds and have very little protection. A blow on a bird's back would almost certainly injure a scapula.

The sternal keel was injured in 31 specimens. In a number of instances the injury can definitely be attributed to the effect of shot. In fig. 5 (Plate 13) a circular hole 13 by 11 mm. can be noted in the

keel. The same shot also made a rectangular opening 17 mm. long in the body of the sternum. In several instances, especially in the smaller birds, the keel has been injured at its anterior end, as a result, probably, of the bird flying into some object.

The body of the sternum showed evidence of repair in 19 instances, and most of these, like that of the keel, were the result of gunshot. It is remarkable, indeed, that a bird like specimen K. U. 19931, *Corvus cryptoleucus*, White-necked Raven (Plate 13, fig. 5) could live after it had been injured so severely. Yet, the injury was not a recent one, as the process of repair had been well advanced. It may sound ironical but it is nevertheless true that the very same bird having received this injury and overcome it, was then collected by the U. S. Bureau of Biological Survey as a specimen in their food-habits research, and is now a permanent record in the University Museum.

The three main bones of the wing, the ulna, radius, and humerus, have been injured and repaired in 51 instances, the humerus 11, ulna 16, and radius 24. Of the 51 injuries, 15 were in the family Anatidae. The majority of these injuries were of such a serious nature that the bird was certainly unable to use that wing for a period of two or three weeks. It is difficult to conceive any particular reason why these bones should be injured. In a few instances the wounds were probably caused by gunshot.

The procedure followed in designating a certain fracture or injury as caused by gunshot was first to examine the bone carefully for shot. In a number of instances shot were present. When a likely circular cavity in a bone was observed, and when the shot itself could not be found, an attempt was made to determine whether the opening might have had a pathological origin. If no pathological evidence was discovered in the bone structure it was designated as having been caused by shot.

In a number of instances where a bird is seriously wounded, the injury has not been severe enough to cause immediate death. The injured bird then hides away for several weeks nursing its wounds. If it is successful in evading its enemies and in securing food it will again be able to take to the air, and in a short time to lead a fairly normal life.

Dr. Frank M. Chapman (Bird-lore, 60: 268-269, 1907) gives an account of a merganser that had been injured during the hunting season. The injury was a fracture of the humerus. This bird was unable to join its comrades in the spring migration. It had escaped by crawling under a log where it would hide during the winter. The mending of the fracture had left the bone greatly distorted and useless in flight.

Dr. Chapman asks the question, why, if (as had been asserted) birds set their leg bones, do they not apply that alleged surgical ability to their wings?

The femur, tibia, fibula and tarso-metatarsus have sustained 63 injuries. (The terms tibia and fibula instead of tibio-tarsus have been used because it was thought that the two terms would be more definite.) Considered separately the femur sustained 14 injuries, the tibia 19, the fibula 11, and the tarso-metatarsus 19. In most instances a leg injury would not be as serious as a wing injury since it would be easier for a large bird, such as a hawk or a duck, to obtain its food if it had a fractured femur than it would be if the humerus were fractured.

In specimen K. U. 22197 *Buteo swainsoni* and K. U. 22198 of the same species, the head of the femur had been severed from its shaft. In K. U. 22197 the head of the femur had become fused inside the acetabulum by the growth of callus. Such a fracture would leave the bone without any support except that of the muscles.

Injuries to the bones of the leg could occur in a number of ways. In several instances it had been caused by shot. The birds that are inhabitants of bodies of water might be bitten on the legs by turtles. In those birds like the hawks and owls, a bone of the leg could be fractured when the bird has its prey in its grasp. For instance, if a Rough-legged Hawk in pursuit of a large jack rabbit, weighing as much as or more than the hawk, succeeded in grasping it, and the rabbit ran under something, the chances are that the bird would receive a fracture of a leg before it could succeed in releasing its grasp.

With the above discussion of the leg bones most of the injuries have been considered. There remain the smaller bones of the wing and leg and such injuries as were thought to be of no particular interest to consider in detail.

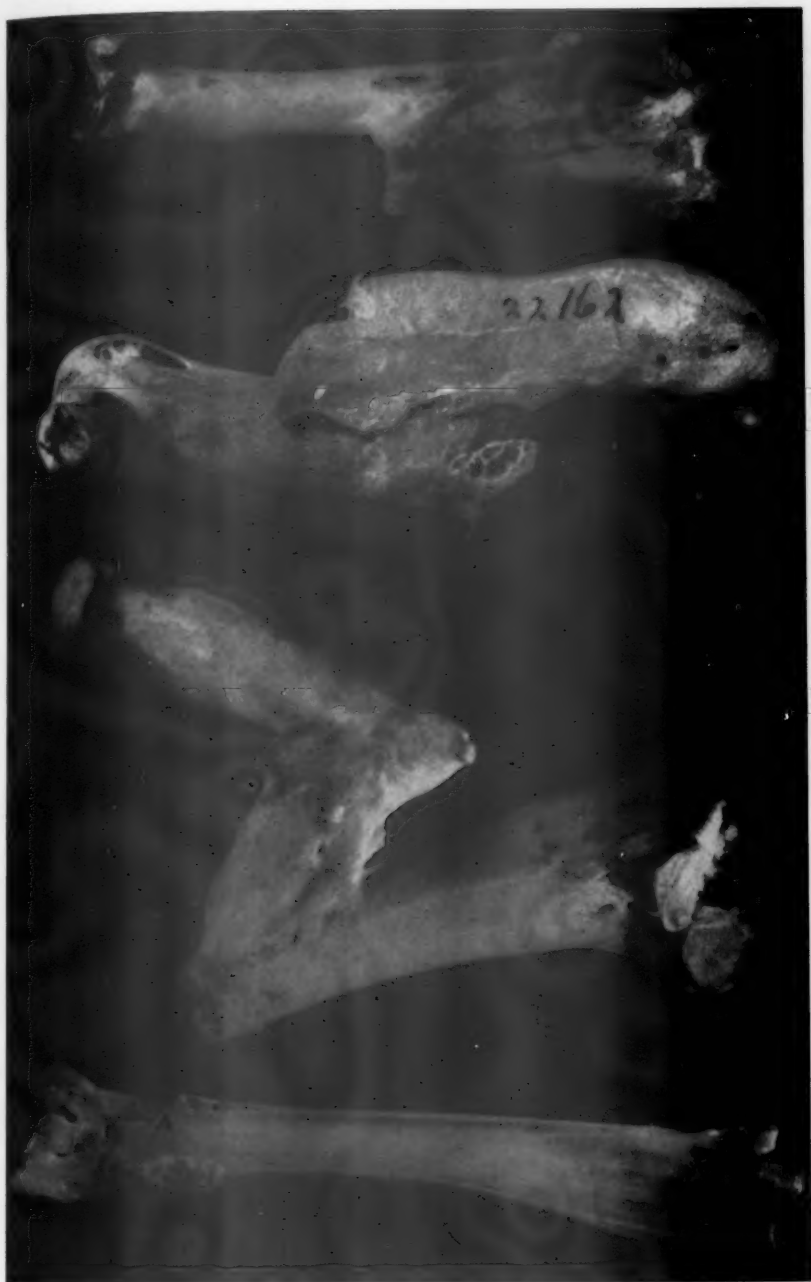
It may be of interest to discuss the Ostrich skeleton K. U. 20490 in which there were numerous injuries. Only the fractures of the right and left pubis have been mentioned in the account. The other fractures in this specimen have not been considered in the tabulations. This specimen, a female, was in the Kansas City Zoological Garden along with a number of others in the same pen. Of 32 fractures that had mended, the majority were of the ribs. Large bones such as the pubis and sternum were also fractured. Some of the vertebrae show a condition that may have been osteomyelitis, a disease that has not been considered in this paper. The only plausible explanation for so many injuries is that the animal probably received the fractures when it was kicked by other Ostriches.

CASES OF BONE INJURY EXAMINED

<i>Family</i>	<i>Number Examined</i>	<i>Number Injured</i>	<i>Per cent</i>
Struthionidae.....	2	2	100.00
Gaviidae.....	2		
Colymbidae.....	14		
Hydrobatidae.....	2		
Pelecanidae.....	15	2	13.33
Phalacrocoracidae.....	8		
Fregatidae.....	2		
Ardeidae.....	84	6	7.14
Phoenicopteridae.....	1		
Anatidae.....	256	33	12.89
Cathartidae.....	32	27	21.84
Accipitridae.....	290	25	8.62
Falconidae.....	49	2	4.08
Tetraonidae.....	25	2	8.00
Perdidae.....	45	1	2.22
Phasianidae.....	10	1	10.00
Meleagridae.....	8		
Gruidae.....	5		
Rallidae.....	39	2	5.12
Haematopodidae.....	2		
Charadriidae.....	59	5	8.49
Scolopacidae.....	311	10	3.21
Recurvirostridae.....	8	1	12.50
Phalaropidae.....	5	1	20.00
Laridae.....	60	6	10.00
Rynchopidae.....	1		
Columbidae.....	82	5	6.09
Psittacidae.....	19		
Cuculidae.....	885	4	4.06
Tytonidae.....	13	1	7.69
Strigidae.....	187	16	8.55
Caprimulgidae.....	83	7	8.43
Micropodidae.....	55	1	1.81
Trochilidae.....	15		
Alcedinidae.....	11	1	9.09
Picidae.....	326	9	2.76
Tyrannidae.....	280	12	4.27
Alaudidae.....	88	9	11.36
Hirundinidae.....	143	4	2.79
Corvidae.....	358	11	3.07
Paridae.....	161	7	4.34
Sittidae.....	29		
Certhiidae.....	27		
Cinclidae.....	1		
Troglodytidae.....	140	2	1.42
Mimidae.....	105	1	.95
Turdidae.....	199	15	7.53



REPAIRED BONE INJURIES



REPAIRED BONE INJURIES

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CASES OF BONE INJURY EXAMINED—Continued

Family	Number Examined	Number Injured	Per cent
Sylviidae	89		
Motacillidae	23	1	4.34
Bombycillidae	24		
Ptilogonatidae	2		
Laniidae	71	1	1.40
Sturnidae	52	1	1.92
Vireonidae	122	3	2.45
Compothlypidae	286	5	1.75
Ploceidae	21	1	4.76
Icteridae	443	32	7.22
Thraupidae	35	1	2.85
Fringillidae	1202	24	1.99
Total	6212	280	4.50

The highest percentage of injuries, considering the families in which there were enough specimens to insure accurate data, occurs in the family Anatidae (ducks and geese). There were 33 injuries in the 256 specimens or 12.89 per cent. The family Alaudidae (larks) is second with 9 of the 88 specimens or 11.36 per cent having evidence of injury. The family Accipitridae (hawks and eagles) is third with 8.62 per cent of the 290 specimens displaying injuries.

Only 1 or 0.95 per cent of the 105 specimens in the family Mimidae (mockingbirds and thrashers) shows evidence of an injury. This is the lowest percentage of any of the families considered. The family Fringillidae (grosbeaks, sparrows and finches) with 1,202 specimens, had only 24 birds with mended injuries or 1.99 per cent.

In 33 of the 280 birds with mended injuries there is sufficient evidence to say that their injuries were caused by shot. Thus 11.78 per cent of all the injuries is the result of the deliberate activity of man. Six of the 33 were in the family Anatidae which are termed 'game-birds' and are hunted. This, however, leaves 27 to account for and the only reason that these birds were shot is the killing instinct in man.

In 64 birds there were two or more bones injured and mended. This fact may not prove anything in particular but it does show the vitality of the birds.

Twenty-two bones had been injured more than once. In the majority of instances the injuries had been simultaneous, but in others they were on different occasions.

The amount and texture of the callus that was formed around the injury is quite variable. In certain instances the callus is abundant and bulbous, and the texture is very porous. In others the callus is

small and very compact. Much of the variation is due to the fact that the process of mending was in a different stage when it was arrested by the death of the specimen. Where the process was well under way there would be much callus present. Secondary infection would also alter the texture and amount that surrounded the bone.

In some of the specimens the setting of the fracture has been very accurate. The amount of callus is small and the texture is nearly that of the bone itself. It is, indeed, astonishing that this should occur at all, considering the odds against these birds.

CONCLUSIONS

In conclusion it may be of interest to reiterate several of the points that have been brought out in the foregoing pages.

1. Of the 6,212 skeletons examined, 4.50 per cent were injured and mended.
2. The skeletons of male birds were injured 0.11 per cent oftener than those of females but the injury in the females concerned 0.09 per cent more bones than in the males.
3. Very few of the skeletons were pathologic other than as the result of injury.
4. Injuries occurred as often on the left side of the birds as on the right.
5. Passeriform birds have the highest percentage of clavicular injuries. The chances are 3 to 1 that an injured bone will be a clavicle.
6. Hawks, owls, and ducks have a high percentage of injuries to the wings and legs.
7. Of the total injuries, 11.78 per cent have been the result of gunshot wounds.
8. The highest percentage of injuries was in the family Anatidae (ducks and geese).
9. The lowest percentage was in the family Mimidae (mockingbirds and thrashers) with 0.95 per cent.

EXPLANATION OF PLATES

PLATE 13

Fig. 1.—Rocky Mountain Grosbeak (*Hedymeles melanocephalus papago*). K. U. 19214. Dorsal view of skull. Injury of the right parietal of the skull.

Fig. 2.—Green-winged Teal (*Nettion carolinense*). K. U. 17771. Ventral view of lower jaw. Shot fractured right and left dentaries.

Fig. 3.—Carolina Wren (*Thryothorus ludovicianus*). K. U. 12765. Lateral view of right femur. Right femur 21 per cent shorter than left. The callus is quite porous but the mending has been firm.

Fig. 4.—Western Meadowlark (*Sturnella neglecta*). K. U. 17292. Anterior view of furcula. Both clavicles had been fractured and mended. Notice the great amount of callus.

Fig. 5.—White-necked Raven (*Corvus cryptoleucus*). K. U. 19931. Lateral view of right side of sternum. Note the large hole 13 by 11 millimeters in the sternal keel and the fracture of the right clavicle.

PLATE 14

Fig. 6.—Lesser Prairie Chicken (*Tympanuchus pallidicinctus*). K. U. 20903. Lateral view of left femur. The callus is very firm and of nearly the same texture as the bone itself.

Fig. 7.—Black Vulture (*Coragyps atrata*). K. U. 22162. Lateral view of left femur. The distal portion of the femur has become fused anterior to and upon the proximal end. Left femur 2.1 centimeters or 24 per cent shorter than the right.

Fig. 8.—Ferruginous Rough-leg (*Buteo regalis*). K. U. 22147. Lateral view of left femur. The bone was distorted so that it was 2.5 centimeters or 27 per cent shorter than the right.

Fig. 9.—Ferruginous Rough-leg. K. U. 22159. Posterior view of left tarso-metatarsus. Notice the shot at A.

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BREEDING EUROPEAN CORMORANTS OF
NORTH AMERICA

BY HARRISON F. LEWIS

IN THE summer of 1940 an opportunity to obtain a fairly accurate record of the breeding population of the European Cormorant (*Phalacrocorax carbo carbo*) at its known nesting places in Canada presented itself. Leaving out of account the Cormorant colonies in Greenland, which for the present purpose may be treated as not part of North America, these Canadian colonies are the only North American ones now known. Although information about these nesting places has been accumulating in recent years, no detailed record of the number or size of this cormorant's breeding colonies on the large island of Anticosti, in the northern part of the Gulf of St. Lawrence, has been available. The species was known to nest on limestone cliffs on the eastern part of the north side of the island and it was surmised that more than half of the European Cormorants of North America might have their homes there.

Through the coöperation of the Consolidated Paper Corporation, which owns Anticosti, and of Mr. H. E. Graham, Resident Manager of the island, I travelled along the entire north shore of that island, a distance of about 140 miles, in one of the Corporation's motor patrol-boats, on June 7, 8, and 9, 1940. Because the sea on those days was remarkably smooth and our shallow-draught boat was navigated by skilled men who, from long experience, knew that coast in great detail, we were able, in spite of extensive fringing reefs, to pass very close to shore. In order to permit me to obtain as much information as possible about the seabirds nesting on the numerous cliffs on that side of the island, we made a practice of entering the bays and passing close around each headland. With the aid of a six-power binocular the birds and nests on the cliffs were observed very satisfactorily. I believe that on June 8 and 9, I saw every colony of nesting European Cormorants on the north side of Anticosti and obtained careful counts, not estimates, of the number of occupied nests in each colony. The resulting tabulation is therefore believed to have a high degree of accuracy. Mr. Charles McCormick, who commands the boat on which I travelled and whose duties have given him a detailed acquaintance with the entire coast of Anticosti, told me that there are no cormorant colonies on the part of the coast of that island that I did not see. This was to be expected, for most of the

south shore of Anticosti, being low and shelving, is lacking in suitable situations for the nesting of European Cormorants and other seabirds.

Taverner (*Canadian Field-nat.*, 43: 77, 1929) reported forty European Cormorant nests, or eighty breeding birds, from Cape Observation, Guy Point, and a point between (Cape Vauréal) in 1928. As these three colonies contained 266 breeding birds of this species in 1940, the contrast suggests that the Anticosti population of European Cormorants underwent in the interval an increase of large proportions.

Later in the summer of 1940, I counted the occupied nests of European Cormorants in their colonies on the north shore of the Gulf of St. Lawrence, a part of Saguenay County, Quebec, where I have made similar counts annually for a number of years past. The nests in the colonies on Lake Island and on one of the Outer Wapitagus Islands, which together form one nesting group, were counted on July 3. The nests in the colony on Cliff Island, in St. Mary Islands Bird Sanctuary, were counted by the sanctuary caretaker, Mr. Fred W. Osborne, in June and by me on July 5. Each of these two groups of European Cormorants showed a notable increase in numbers in 1940, as compared with their population in 1939. The Lake Island-Wapitagus group increased from 220 breeding birds to 292, and the St. Mary Islands group from 132 breeding birds to 172.

Mr. Frank L. Prest, of Leslie, Magdalen Islands, Quebec, very kindly took the trouble, in response to a request from Mr. Hoyes Lloyd, to visit Entry Island, Magdalen Islands, early in July 1940, and examine the nesting colony of European Cormorants there and to report their numbers. This colony has increased greatly since my visit to it in May 1924, when it had a population of fourteen breeding birds. Mr. Prest also reports that European Cormorants in 1940 founded a new colony, containing five nests, on the north side of Bryon Island, Magdalen Islands. For some years past, non-breeding birds of this species have been accustomed to roost in summer on ledges on the cliffs of this island.

Both Mr. Harold S. Peters, Atlantic Flyway Biologist, of the United States Fish and Wildlife Service, and Mr. Robie W. Tufts, Chief Federal Migratory Bird Officer for the Maritime Provinces, took the trouble to visit, in 1940, the recently established colony of European Cormorants at Crystal Farm, Antigonish County, Nova Scotia, and to report on it. Mr. Peters's visit was made in early June; Mr. Tufts's on July 16. It is difficult at any time to make an accurate count of the breeding population of European Cormorants in this

colony, which is situated on a mainland cliff facing the sea, and in which Double-crested Cormorants form a large majority, and as conditions for making a close estimate of numbers were more favorable at the time of Mr. Peters's visit than later in the summer the figures published below for this colony are based on his report. Mr. Tufts visited, on July 18, 1940, the colony of European Cormorants on Hertford Island, one of the Bird Islands, off the coast of Victoria County, Cape Breton Island, Nova Scotia, and reported a very accurate count of the occupied nests in that colony.

It is, of course, quite possible that additional colonies of European Cormorants nest on suitable cliffs in northeastern North America, but I have no certain knowledge of any. Although Kumlien (Bull. U. S. Nat. Mus., no. 15: 94, 1879) reported this species as breeding in Cumberland Sound, Baffin Island, J. Dewey Soper (Bull. Nat. Mus. of Canada, no. 53: 86, 1928) suggests that it "may now be extinct on Baffin Island."

The known North American breeding population of the European Cormorant, in 1940, as determined by the investigations described above, is summarized in the following table, in the preparation of which an occupied nest has been considered to indicate the presence of two breeding birds.

BREEDING POPULATION OF EUROPEAN CORMORANTS
IN NORTH AMERICA IN 1940

<i>Site of colony</i>	<i>Number of breeding birds</i>
Cape Observation, Anticosti, Quebec.....	154
Cape Vauréal, Anticosti, Quebec.....	30
Guy Point (Garden Cape), Anticosti, Quebec.....	82
Bear Head, Anticosti, Quebec.....	32
Tower Point (Cape Metallic), Anticosti, Quebec.....	32
Cape Robert, Anticosti, Quebec.....	42
Harvey Point (Cape Henry), Anticosti, Quebec.....	24
Battery Point, Anticosti, Quebec.....	154
Joseph Point, Anticosti, Quebec.....	34
Mill Bay, Anticosti, Quebec.....	16
Prinsta Bay (Deep Bay) to Table Head, Anticosti, Quebec.....	100
Fox Point, Anticosti, Quebec.....	10
Reef Point to Merrimack Point (Baie Innommée), Anticosti, Quebec.....	210
Cape Sandtop, Anticosti, Quebec.....	18
Gullicliff Bay, Anticosti, Quebec.....	180
East Point, Anticosti, Quebec.....	92
Total, Anticosti.....	1,210

Lake Island, Saguenay Co., Quebec.....	280
Outer Wapitagan Islands, Saguenay Co., Quebec.....	12
St. Mary Islands, Saguenay Co., Quebec.....	172
<hr/>	
Total, north shore of Gulf of St. Lawrence.....	464
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Bryon Island, Magdalen Islands, Quebec.....	10
Entry Island, Magdalen Islands, Quebec.....	300
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Total, Magdalen Islands.....	310
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Crystal Farm, Antigonish Co., Nova Scotia.....	110
Bird Islands, Victoria Co., Nova Scotia.....	78
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Total, Nova Scotia.....	188
<hr/>	
GRAND TOTAL, North America.....	2,172

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NIDIFICATION OF THE BIRDS OF DOMINICA, B. W. I.

BY JAMES BOND

ALTHOUGH Dominica is the largest and one of the least developed of the British Lesser Antilles, it is better known ornithologically than any other island of the group. Not only have a number of skilled collectors explored the island, including Ober, on behalf of the United States National Museum, and Beck, on behalf of the American Museum of Natural History, but, in addition, there resides at Roseau a man who is one of the most competent field naturalists now resident in the West Indies. I refer to Mr. Percival Agar. Although I have never had the good fortune to meet this gentleman, I have corresponded with him for a number of years and he has not only helped to complete the collection of Dominican birds in the Academy of Natural Sciences of Philadelphia, securing or being instrumental in securing those forms that I failed to find during my visit to the island in 1927, but he has also collected for me the nests and eggs of the majority of the resident birds.

In the present paper I refer repeatedly to two reports on the birds of Dominica that were published toward the end of the nineteenth century:—(a) 'Catalogue of the birds of Dominica from collections made for the Smithsonian Institution by Frederick A. Ober, together with his notes and observations' by George N. Lawrence (Proc. U. S. Nat. Mus., 1: 48–69, 1878); (b) 'Notes on the fauna of the Island of Dominica, British West Indies, with lists of the species obtained and observed by G. E. and A. H. Verrill' (Trans. Connecticut Acad. Arts and Sciences, 8: 315–350, 1892).

I see no reason to describe herewith the physical features of Dominica nor to discuss the abundance and distribution of its bird-life, since this has been adequately done in the above reports. It is sufficient to say that no bird, with the exception perhaps of the Diablotin (*Pterodroma*), is in any immediate danger of extinction. Even the two species of parrots should thrive for many years, if they are left unmolested in their wild terrain; but they should, of course, be rigidly protected.

The abundance of birds on Dominica, as compared with other Lesser Antillean islands, is very noticeable and, without wishing to detract from the accomplishments of Mr. Agar, is largely responsible for his phenomenal success. This is accounted for by the facts that the mongoose has not been introduced there and that the island has

remained in its primitive wild state, only a very small area being under cultivation, owing to the ruggedness and inaccessibility of its mountains.

Of the 54 species of birds supposed to nest on Dominica, Mr. Agar has forwarded to me at the Academy of Natural Sciences of Philadelphia sets of eggs of no less than 42, including the nests of all except the larger forms. The eggs of two other species have been taken on the island and, of the remainder, nine have been found nesting elsewhere in the West Indies. Three species, *Gallinula chloropus cerceris*, *Sterna hirundo hirundo* and *Holoquiscalus lugubris guadeloupensis*, are recorded from Dominica for the first time. The nomenclature here used is that of my 'Handbook of Birds of the West Indies', 1936.

ANNOTATED LIST OF BREEDING BIRDS

BLACK-CAPPED PETREL, *Pterodroma hasitata*.—Formerly nested in the mountains of Dominica and Guadeloupe and may still do so in greatly reduced numbers. The species was rediscovered in Dominica in 1932 by Dr. Daniel Thaly, chairman of the Victoria Museum (Roseau). Sydney Porter states (*Avic. Mag.*, (4) 8: 156, 1930) that "when making a journey through the forest in search of *Amazona imperialis* my guide . . . said that there were still some [*Pterodroma hasitata*] left upon the mountain, described them to me exactly, and finished up by saying that they had webbed feet and nested in holes in the rocks. He said that their haunts were almost inaccessible." Mr. Agar believes, however, that the Black-capped Petrel no longer nests in Dominica. (For a full account of this interesting petrel see Murphy's 'Oceanic Birds of South America,' 2: 692-697, 1936.)

YELLOW-BILLED TROPIC-BIRD, *Phaethon lepturus catesbyi*.—A small colony was found nesting on the cliffs near Petite Savanne on June 2, 1938. An egg taken measures 55.6×38.3 millimeters.

The Red-billed Tropic-bird, which evidently nests on Montserrat, Guadeloupe and Desirade, has not as yet been found at Dominica. Brown Pelicans, Frigate-birds and Boobies occur in the vicinity of Dominica but are not known to nest on the island.

AMERICAN EGRET, *Casmerodius albus egretta*.—Recorded by Verrill from Dominica and declared by him to be a rare and local resident of the island. Mr. Agar writes (1937) of a pair possibly nesting in the vicinity of the Hampstead River and he was informed that the species is found on the Indian River at Portsmouth.

SNOWY EGRET, *Egretta thula thula*.—Taken by Ober in Dominica. I know nothing of its status on the island. Mr. Agar considers this heron to be merely a casual visitant to Dominica.

LITTLE BLUE HERON, *Florida caerulea*.—A small colony, consisting of three pairs, was found nesting at the source of the Roseau River, below the fresh-water lake, on May 18, 1938. The nests were situated in trees twenty to twenty-five feet above the ground. Eggs of the one set taken measure 43.6×33 , 43.6×34 , 44.8×33.8 millimeters, respectively.

LITTLE GREEN HERON, *Butorides virescens maculatus*.—A nest and eggs of this common heron were found by Mr. Agar in a small tree on a river bank in April 1934. The three eggs measure 38.5×29.8 , 39×30 , 39.7×30.3 millimeters.

YELLOW-CROWNED NIGHT HERON, *Nyctanassa violacea violacea*.—Mr. Agar found, on April 13, 1936, a nest of this widespread species "in a tall tree overhanging a deep valley." The two eggs measure 52×38 , 52.2×38.6 millimeters.

BROAD-WINGED HAWK, *Buteo platypterus rivieri*.—A set of two heavily incubated eggs of this hawk was collected by Mr. Agar. The nest, "the usual structure of sticks and twigs," was placed in a tall silk-cotton tree between eighty and a hundred feet above the ground. The eggs are buffy white, blotched and clouded with rather dull chocolate-brown and measure 50.3×38.5 , 51.5×39.5 millimeters. Eggs from St. Lucia (two sets examined) are similar in coloration. It is interesting to note that a single egg of the southern Lesser Antillean race, *antillarum*, taken by me in St. Vincent, is an immaculate bluish white, and six sets, taken on Grenada by Grant Wells, are all said to be white, a most remarkable local variation if constant (Wilson Bull., nos. 76-77: 262, 1911). Mr. Agar informs me, however, that one of a set of three eggs, taken by him in Dominica, is almost immaculate.

The race *rivieri* is known from three of the Lesser Antilles,—Dominica, Martinique and St. Lucia.

SPARROW HAWK, *Falco sparverius caribaeorum*.—A nest of the Sparrow Hawk was located at the base of a frond of a tall coconut palm. Mr. Agar writes that it was "the usual hawk-like structure of sticks and twigs." The nest when found contained one egg, which was taken. A week later (April 10, 1937) two more eggs had been laid, indicating that three eggs constituted the set. After the taking of these eggs, the nest was torn down and another built on the other side of the same palm. This would seem to be an unusual situation, since the Sparrow Hawk habitually lays in cavities of trees elsewhere in the West Indies and Mr. Agar informs me that they sometimes do so in Dominica. However, the above nests are not the only ones that Mr. Agar has found situated in a palm in Dominica. Perhaps the scarcity of natural cavities in trees has induced these birds to alter their mode of nesting!

The three eggs are buffy white, heavily peppered with bright reddish brown, and also blotched with this color, in two eggs about the larger ends, in one egg at the smaller end. The markings on one egg, possibly the last laid, are decidedly duller. The eggs measure 38.2×28 , 36.5×28.8 , 35.6×29.2 millimeters.

PURPLE GALLINULE, *Porphyryla martinica*.—There is but one published record of the Purple Gallinule from Dominica and the bird is very likely a straggler to the island (Proc. U. S. Nat. Mus., 1: 197, 1878). Mr. Agar writes that an immature bird, brought to Dr. Daniel Thaly of Roseau some years ago, was the only individual of this species he has ever seen. Dr. Thaly informs me that he kept this bird in an aviary for several years.

FLORIDA GALLINULE, *Gallinula chloropus cerceris*. Mr. Agar found "several" of these birds on the fresh-water lake but failed to find a nest. Natives assured him that they had frequently seen young swimming on the lake.

COMMON TERN, *Sterna hirundo hirundo*.—Mr. Agar writes me that a fairly large colony of these terns was nesting in company with *Sterna anaethetus* and *Anous stolidus* on a promontory at Grand Bay at the southern end of the island (June 12, 1937). A set of two eggs was taken; these measured 41.8×31.4 , 42.5×30.4 millimeters, respectively. The eggs are handsomely marked and resemble eggs of this species, taken in North America, in the collection of the Academy of Natural Sciences. They differ strikingly from eggs of *Sterna dougalli* taken in Dominica by Agar in 1934.

This is apparently the first nesting record of the Common Tern from anywhere in the Antilles, although Hartert found the species breeding in Bonaire in the south Caribbean.

ROSEATE TERN, *Sterna dougalli dougalli*.—A set of eggs of this tern was taken by Mr. Agar on a little island off the windward coast of Dominica. A small colony was nesting there at the time (May 1934). The three eggs measure 40.5×30.3 , 42×30.4 , 42.7×30.5 millimeters. They are decidedly less handsomely marked than those of the Common Tern.

BRIDLED TERN, *Sterna anaethetus anaethetus*.—Writing from Ste. Marie on the windward coast of Dominica on April 20, Ober states: "This bird made its first appearance a week ago, coming from the open ocean, to breed upon a rock off this stormy shore. My Indian boys procured twenty eggs from the rock. The birds leave the island as soon as the young are fledged."

Mr. Agar found this species nesting at Grand Bay in June 1937. One heavily incubated egg was taken. This is dull white, spotted with blackish and dark chocolate-brown with underlying markings of lavender gray and measures 46.5×33.3 millimeters. It is much less heavily marked than the eggs of either of the preceding species. The Bridled Tern is not known to lay more than one egg in the West Indies.

The Least Tern and the Sooty Tern have been recorded from Dominica but are not known to breed here. When in Martinique, I was informed that seabirds, probably terns, nested in abundance on islets near the Presquile de la Caravelle, but none was there during my visit.

NODDY, *Anous stolidus stolidus*.—Mr. Agar writes me that "at least a dozen pairs" of these terns were present among the colony of terns at Grand Bay (1937). Although he did not succeed in finding a nest, he feels certain that the birds were breeding here at the time.

WHITE-CROWNED PIGEON, *Columba leucocephala*.—Recorded from Dominica by Verrill but as far as I am aware no specimens have been taken on the island. The species is migratory in many parts of its range and may be of casual occurrence on Dominica, south of which, in the Lesser Antilles, this pigeon has not been recorded. Mr. Agar has never seen this bird and says that it is unknown to most of the local hunters.

SCALY-NECKED PIGEON, *Columba squamosa*.—A nest of this pigeon was found on May 16, 1938, on the leeward side of a high ridge, 3000 feet above sea level. The nest was placed in the side of a 'wild pine' growing from a small tree. There were two slightly incubated eggs in the nest, one of which was knocked out of the nest by the parent bird on leaving. The remaining egg measures 36.5×26 millimeters. A second nest in process of construction was found a few days later. This was also situated in the side of a wild pine, but much higher,—between thirty and forty feet above the ground in a 'Gomier' tree. Natives claim that these pigeons always nest in Dominica on the summits of the highest ridges, where there is almost continual mist and rain.

ZENAI DA DOVE, *Zenaida aurita aurita*.—On April 20, 1936, a nest of this dove was found ten feet up on a ledge of a low, rocky cliff, a most unusual situation, since the species habitually builds in low trees. The two white eggs measure 30.7×23.2 , 31.3×23.5 millimeters.

GROUND DOVE, *Columbigallina passerina nigristrois*.—A nest of the Ground Dove, found May 1935, was placed in a tree stump three feet above the ground. The two white eggs measure 21.7×17.3 , 23.3×17.8 millimeters.

Three skins from Dominica are decidedly smaller than Martinique birds (*trochila*), and are best referred to the recently described *nigrirostris* Danforth.

RUDDY QUAIL-DOVE, *Oreopeleia montana martinica*.—A nest of this quail-dove, found on May 11, 1936, was merely a bunch of "large dead leaves, placed loosely, one above the other, in a tree-fern four feet above the ground." The two eggs measure 28×21.5 , 30.3×22.1 millimeters.

A. H. Verrill's statement that this species sometimes nests on the ground I consider doubtful. I have taken its eggs both in St. Lucia and in St. Vincent.

MOUSTACHED QUAIL-DOVE, *Oreopeleia mystacea mystacea*.—Mr. Agar has sent me a nest and eggs of a quail-dove which were brought to him by an old woodsman, who claimed to have seen the incubating bird which "he described accurately." The nest was situated "at the end of a small branch about four feet above the ground." It is rather more solidly constructed than is the average nest of the Ruddy Quail-dove, being composed of sticks and dead leaves, with a rough lining of whitish plant fibers. The eggs are ochraceous cream in color, decidedly paler, less salmon-buff, than are those of the preceding species. They measure 28.5×22.4 , 30.5×22.6 millimeters. Both the nest and the eggs agree with Danforth's description of the nidification of this dove ("The Birds of St. Lucia," Monogr. Univ. Puerto Rico, pp. 45-46, 1935).

IMPERIAL PARROT, *Amazona imperialis*.

LESSER DOMINICAN PARROT, *Amazona arausiaca*.—Mr. Agar writes me as follows concerning the two Dominican parrots: "I have been told that the smaller *bouqueti* [= *arausiaca*] nests in holes in tall trees and in May this year (1935), when climbing Morne Diablotin, where both species are found more commonly than in any other part of the island, our guide, who has spent the greater part of his life hunting wild pig and agouti, assured me that he knew of one spur of the mountain where the Imperial Parrot nested yearly, as he had found eggshells on the ground beneath the trees. He also assured me that it was high enough on the mountain to be in the belt where the trees are stunted and he thought that the nests could be reached without much difficulty."

An egg of the Imperial Parrot in the Rothschild Collection at Tring, England, measures approximately 45.5×40 millimeters. It was laid by a captive bird.

LESSER ANTILLEAN BARN OWL, *Tyto insularis nigrescens*.—Ober states that the Barn Owl in Dominica nests "in a hollow tree or in the hollow of a large limb and lays eggs, elliptical in shape, white and granular." A set of three taken by him (September 19) measured "1.6 \times 1.22 inches" or approximately 41×31 millimeters.

MANGROVE CUCKOO, *Coccyzus minor dominicae*.—A nest of this cuckoo, found in May 1935, by Mr. Agar, is described as a rather frail platform of sticks, loosely put together. It was situated ten feet up in a mango tree. The two eggs are light bluish green in color and measure 32.7×26.2 , 33.8×25.7 millimeters. They are larger and somewhat darker and greener than a single egg of *Coccyzus minor nesiotus*, taken by me on Gonave Island, Haiti.

SMOOTH-BILLED ANI, *Crotophaga ani*.—A nest, found by Mr. Agar in February 1934, is described as "a large, untidy structure of twigs and small sticks, lined with a few dead leaves." It was situated in a 'poix-doux' tree, twelve feet above the ground. The eight eggs are thickly coated with the usual white calcareous deposit. These measure 33.2×26.6 , 33.9×27.3 , 34.2×27.2 , 34.5×27.5 , 35×26.1 , 35.3×27.7 , 35.3×25.8 , 35.8×28 millimeters.

BLACK SWIFT, *Nephoecetes niger niger*.—On July 27, 1938, a colony of these swifts was found nesting near Laudat, below the fresh-water lake. The rather bulky, cup-shaped nests of moss were situated on ledges or in holes on the sides of a small, damp and gloomy ravine not wider than five to ten feet and perhaps twenty to twenty-five feet high, in dense forest. Ten nests were found here, most of which were incomplete and unoccupied. Two contained one egg each, one of these measuring 26×17.7 millimeters.

According to Mr. Agar, this swift is not resident in Dominica, arriving early in March and departing to some unknown locality about the end of August or beginning of September. It is of interest to note that there is a record of this bird from the Merume Mountains, British Guiana. The Black Swift has previously been found nesting only in California (*N. n. borealis*).

LESSER ANTILLEAN SWIFT, *Chaetura martinica*.—Ober states that these little swifts "breed among the cliffs high up in the mountains and near the water-falls of the Roseau Valley." Agar writes: "I have never actually taken the nest of this bird but I know of two very high, completely unscalable cliffs, where I have observed them in the nesting season."

In the great ravine at Macouba, in extreme northern Martinique, I found this swift in great numbers and was assured by the natives that they nested on the precipitous slopes, where the nests are at times accessible without the use of a rope. I examined recently a set of three eggs of this swift in the collection of Mr. George D. Smooker, of Trinidad, who informs me that it was taken by Mr. Henessey du Pigny at Springhill, Dominica, for A. H. Verrill on April 30, 1893. The nest is said to have been situated "in an old oven!" There is no description of the nest, which doubtless resembles those of other species of the genus *Chaetura* (see my 'Birds of the West Indies,' p. 200). The three white eggs measure 19×14.3 , 18.3×14.2 , and 17.1×13.8 millimeters.

GARNET-THROATED HUMMINGBIRD, *Eulampis jugularis*.—On March 24, 1936, Mr. Agar found a nest of this hummingbird twenty feet above the ground in a bread-fruit tree. The nest was saddled on a limb and is composed chiefly of strips of tissue-like bark, decorated externally with lichen together with a little moss. The two eggs measure 15×10.6 , 16.2×10.4 millimeters.

EMERALD-THROATED HUMMINGBIRD, *Sericotes holosericeus holosericeus*.—A nest, found on March 31, was placed fifteen feet above the ground in a cocoa tree and is a compact cup of cotton, decorated externally with lichen. The two eggs measure 15.1×9.1 , 15.3×9.3 millimeters.

BLUE-HEADED HUMMINGBIRD, *Thalurania bicolor*.—A nest of this species, found on May 20, 1935, was situated eight feet above the ground, in a bush growing out of a bank beside a mountain stream at an elevation of 1600 feet. The nest is composed of the reddish-brown fiber of tree-fern, sparsely decorated externally with strips of palm fiber. The two eggs measure 13.4×8.6 , 13.5×8.6 millimeters.

ANTILLEAN CRESTED HUMMINGBIRD, *Orthorhyncus cristatus exilis*.—A nest of this hummingbird, the commonest of its family in Dominica as well as in all of the Lesser Antilles, was collected on March 17, 1936. It was situated in a small orange tree two and one-half feet above the ground. It is composed of tissue-like pieces of bark with a soft lining of white plant down. Externally it is sparsely decorated with lichen and moss. The two eggs measure 11.6×8 , 11.6×8.2 millimeters.

Nests of all the Dominican hummingbirds, and the eggs of all except those of *Eulampis*, were collected by Verrill.

RINGED KINGFISHER, *Megaceryle torquata stictipennis*.—On May 12, 1937, Mr. Agar discovered a nest of this kingfisher containing three slightly incubated eggs. The entrance to the burrow, which was in a bank twelve feet above the river bed, was remarkably small as was the passageway to the egg chamber. The chamber itself was "large and roomy," and was situated five feet from the entrance, the passageway veering to the right. There was no vestige of a nest proper, but the eggs were deposited on the soft, sandy earth. The eggs are white and visibly porous, some of the pores being blackish, probably attributable to dirt. They measure 39.6×33.5 , 38.1×33.5 , 38×31.8 millimeters. About a month later Mr. Agar found another nest containing young "on the bank of the river at Geneva near Grand Bay."

The known range of this form is Guadeloupe, Dominica, and Martinique.

GRAY KINGBIRD, *Tyrannus dominicensis vorax*.—Mr. Agar has sent up but a single egg of this well-known species. It was taken from a nest situated between sixty and seventy feet above the ground on the frond of a royal palm. The egg is a rich cream-buff, beautifully marked with reddish brown and underlying spots of violet-gray. It measures 27.9×19 millimeters. A set (?) of two eggs was also taken by Ober in Dominica; but the usual complement is three eggs throughout the West Indies.

SOUTHERN CRESTED FLYCATCHER, *Myiarchus tyrannulus oberi*.—A nest, containing three incubated eggs of this flycatcher, was found by Mr. Agar on May 18, 1936. He writes that the nest was situated "in a hole in a tree" and was "so loosely constructed that it almost crumbled to pieces on being removed." The nest is a rough mass of plant fibers, chicken feathers and plant down. The eggs are cream-buff, spotted and heavily scrawled with purplish brown and underlying markings of violet-gray, and measure 23.5×18.6 , 24×18.7 , 24.3×18.9 millimeters. They resemble eggs of this species from St. Vincent and Grenada (*Myiarchus tyrannulus nugator*).

LESSER ANTILLEAN PEWEE, *Blacicus latirostris brunneicapillus*.—On May 4, 1936, a nest of this little flycatcher was found saddled on a dead branch of a cocoa tree ten feet above the ground. It was "well shaded and protected by the leaves of a living branch." The nest is a compact cup of moss, rootlets and plant down, lined with fine rootlets, grass stems and pieces of leaves. The two eggs are cream-buff, heavily wreathed about the middle and widest part with reddish brown and underlying markings of violet-gray. There are also a few blackish specks. Elsewhere the eggs are sparsely marked. They closely resemble those of the Wood Pewee of North America. They are more richly colored than eggs from St. Lucia (*Blacicus latirostris latirostris*) and are more heavily marked than eggs from Haiti (*Blacicus c. hispaniolensis*).

A nest of the St. Lucian form is smaller, is not saddled on a limb and is differently constructed, being composed of rootlets and strips of tissue-like pieces of bark with a rather rough lining of fine black rootlets. The nest from Dominica measures 2.75×1.75 inches, the eggs 17.3×13.5 , 17.6×13.5 millimeters. Verrill describes a nest as being two inches in diameter by three-quarters of an inch high and gives egg measurements decidedly greater than the above. The eggs as illustrated do not resemble those before me and both Mr. Agar and myself doubt the validity of this record; the nest was probably that of a hummingbird and doubtless was brought to Mr. Verrill by a native!

CARIBBEAN ELAENIA, *Elaenia martinica martinica*.—Nests and eggs of this species taken on St. Croix (*Elaenia martinica riisii*) and on St. Vincent, resemble those

sent by Mr. Agar from Dominica. He took a nest of the Caribbean *Elaenia* on June 1, 1935. It was placed in the fork of a branch of a 'poix-doux' tree fifteen feet above the ground. The nest is composed entirely of rootlets with no soft lining. In color the single egg is cream-buff, with a decidedly roseate tinge at the larger end, and is spotted about the larger end with deep reddish brown and with underlying markings of violet-gray; it measures 22×16 millimeters.

Mr. Agar has also sent me a set of two eggs, the usual number for this species, to show variation. These eggs are creamy white, one being sparingly marked about the larger end with blackish and violet-gray, the other having a wreath of small brownish and violet-gray spots about the larger end. These eggs resemble those I have examined of *Elaenia martinica riisii*, whereas the single egg resembles those from St. Vincent. They measure 21.2×16.8 , 21.3×16.6 millimeters.

The nest and eggs described by Verrill under this flycatcher pertain to some other bird, probably the Golden Warbler (*D. p. ruficapilla*).

PURPLE MARTIN, *Progne subis dominicensis*.—The martin was found breeding on the coastal cliffs of Dominica. Three nests with young were located at Calibishie, at the northeast end of the island, on July 20, 1938, and a nest, containing two fresh eggs measuring 21.2×15.9 millimeters each, was taken at Grand Savanna on August 3, 1938. The nest was a "loosely constructed mass of straw and a few pieces of banana trash." These are remarkably late nesting dates. During my West Indian field-work, I found this species nesting in May (in the Greater Antilles) and Bartsch recorded a nesting colony in Haiti as early as April 4. It seems to me possible that martins found in Mexico ("*P. sinaloae*") in summer, with sexual organs enlarged, may have just returned or were about to leave for the West Indies. Although Mr. Robert T. Moore of the California Institute of Technology informs me that his collector found a "breeding colony" of "*sinaloae*" in Mexico, I should like to see, for my own satisfaction, a nest or eggs actually taken in this country.

SOUTHERN HOUSE WREN, *Troglodytes musculus rufescens*.—A nest of this wren, sent by Mr. Agar, was built on a rafter in a corner of a house, under the roof. It is composed of a mass of grass and twigs and is lined with a few feathers. The three eggs are white, thickly spotted with bright reddish brown and underlying markings of violet-gray. The markings are heaviest at the larger ends, where there is a tendency to form a wreath. They measure 17.6×13.5 , 18×13.6 , 19.5×13.5 millimeters. Mr. Agar states that the usual nesting site of this wren is in a hole in a tree or in a hollow log.

Verrill describes the eggs as not differing appreciably from those of a *Coereba* but this is erroneous. They are moreover larger, not smaller than eggs of that species, as he avers.

SCALY-BREADED THRASHER, *Allenia fusca*.—A nest of this thrasher was found by Mr. Agar on May 27, 1936, in a 'poix-doux' tree, twenty feet above the ground. It is a thin but well-constructed cup, composed of sticks and rootlets. The two eggs are a beautiful immaculate greenish blue and measure 28.6×20.7 , 29.5×21.1 millimeters. They are somewhat paler than eggs of this species from Saba.

PEARLY-EYED THRASHER, *Margarops fuscatus densirostris*.—A nest, said to belong to this species, was found on April 24, 1937, situated in a tree high above the ground. It is similarly constructed but is actually smaller than that of *Allenia*. In its construction it differs chiefly in being heavily lined with fine rootlets. The eggs resemble those of *Allenia* but are a trifle larger, measuring 31.8×20.6 , 31×21 , 30.6×21.3 millimeters. I consider the identification of this nest doubtful.

On St. Croix this species (*Margarops fuscatus fuscatus*) nests in a cavity in a tree, while it has been found nesting, on Desecheo Island and on Mayaguana Island, on the side of a cave. On Saba this thrasher is said to nest frequently on the side of a steep cliff, and Mr. Savage English, a long-time resident of Montserrat, informed me that on this island he has found the species (*Margarops fuscatus densirostris*) nesting among the roots of an upturned tree stump, bordering a ravine. A set of eggs that he collected on Montserrat, now in the British Museum, measures approximately 33.5×21 , 33×21 , 32.5×21.5 millimeters.

TREMBLER, *Cinclocerthia ruficauda ruficauda*.—Mr. Agar sent me a nest of the Trembler which he states was "in an unusual situation, being situated in a fairly high coconut palm at the base of a frond, in the little hollow where it grew out of the trunk. Flower sheaths and overhanging fronds turned the site into a hole practically." The nest, which was taken on May 16, 1936, is cup-shaped and is composed of rootlets, lined with finer rootlets and dead leaves. The eggs resemble in color those of the two preceding species but are rather paler than eggs of the Trembleur from Saba (*Cinclocerthia ruficauda pavidula*). They measure 25×19.6 , 26×19.5 , 27×19.6 millimeters.

Although a nest, similarly situated, was found in St. Lucia (*Cinclocerthia ruficauda macrorhyncha*), the usual nesting site of this species would seem to be in the cavity of a tree or in the hollow stump of a tree-fern.

EASTERN RED-LEGGED THRUSH, *Mimocichla ardosiacea albiventris*.—A nest of this thrush, sent by Mr. Agar, is a cup of rootlets, dead leaves and strips of palm-leaf with a few feathers in the lining. It was "placed on the trunk of a tree three feet above the ground, well hidden by new shoots springing from below where the tree had been felled." It was found on May 26, 1935. The two eggs, which were fresh, probably constitute an incomplete clutch, since another nest, containing three eggs, was discovered on the same day, placed "in a similar situation." The two eggs are whitish, heavily marked with rufous brown and grayish violet. They differ from Haitian eggs taken by me (*Mimocichla ardosiacea ardosiacea*), which have a decidedly green background, resembling eggs of *Turdus auranteus* of Jamaica, except that they are much smaller, measuring 28.4×20.3 , 29.2×20.8 millimeters. They agree, however, with Danforth's description of Puerto Rican eggs of this species.

FOREST THRUSH, *Cichlherminia l'herminieri dominicensis*.—A nest of this interesting thrush was found by Mr. Agar on May 12, 1936, in a small tree-fern only one foot above the ground. This nest is a very bulky cup of moss and plant fibers, heavily lined with rootlets. The three eggs resemble in color those of the Lesser Antillean 'thrashers' but two are decidedly greener. Incubation was well advanced when they were taken. They measure 31.5×23.6 , 33.5×23.6 , 34.7×23.8 millimeters.

Verrill collected a deserted nest of this species, containing a few fragments of greenish-blue eggshell. This nest was situated ten feet above the ground.

A nest, containing one addled egg, sent to me from St. Lucia and mentioned in my 'Birds of the West Indies' as said to be that of a Forest Thrush (*Cichlherminia l'herminieri sanctae-luciae*), probably is that of the White-breasted Thrasher (*Ramphocinclus*) of that island. Mr. Stanley John of Castries, who sent me this nest, now concurs in this belief. Semper stated that *Cichlherminia* lays but two eggs in St. Lucia.

A set (?) of eggs in the British Museum that I have examined was taken on Montserrat by Mr. Savage English and is labelled "*Cinclocerthia ruficauda*" (= *Cin-*

cloцерthia ruficauda pavida) but the eggs are almost certainly those of the Forest Thrush (*Cichlherminia l'herminieri lawrencii*); these measure 33.5×24 , and 32.5×24 millimeters, respectively. Unfortunately there are no data with these eggs that would establish their identity beyond question, as the nest of the Forest Thrush is utterly dissimilar to that of any other bird from either Dominica or Montserrat.

ANTILLEAN SOLITAIRE, *Myadestes genibarbis dominicanus*.—A nest and eggs of the Solitaire were collected on May 25, 1937. The nest was situated on the side of a rocky, perpendicular bank of a stream, eight feet above the stream bed. It is a rather bulky but compact cup of moss and rootlets, lined with rootlets and grass stems, and resembles that of a thrush. It is decidedly more bulky than nests of *Myadestes elisabeth elisabeth* that I have examined, although these latter were not taken in rain forest and contained no moss. The two eggs are pale bluish green, spotted with reddish brown, with underlying markings of violet-gray, being heavily spotted at the larger ends. They measure 24.3×17.1 , 24×17 millimeters.

Mr. Agar has found a number of nests of the Solitaire in Dominica, all similarly situated. It is possible, however, that this bird also nests occasionally in trees, as is the case with the closely related *Myadestes genibarbis solitarius* of Jamaica. Verrill's statement that the Dominican Solitaire builds, in a tree, a nest resembling that of a Chipping Sparrow, may be discredited. It is of interest to note that the Antillean Solitaire lays but two eggs, both in Dominica and in Jamaica, whereas the Cuban species lays three.

BLACK-WHISKERED VIREO, *Vireo calidris barbadensis*.—Ober stated that he thought "this bird is a summer visitor only, as I did not see it before March 19th and then only one." I have observed this bird, however, in one or other of the Lesser Antilles throughout the winter and have taken it in Dominica on February 2 and in Montserrat on January 3. It is remarkable that nearly all individuals of this species and of the Gray Kingbird found west of Hispaniola are migratory.

I have seen perhaps twenty nests of this vireo on various islands and all have been the typical pendant structure resembling that of the Red-eyed Vireo. Ober secured a nest, however, that, according to Lawrence, "does not appear to have been pensile." The identification of this I consider open to doubt. A nest found by Mr. Agar on May 20, 1935, is the usual pendant structure of plant fibers and dead leaves, with some grass stems in the lining. Externally the nest is reinforced by cobwebs. It was placed in a tree overhanging a steep cliff and contained two slightly incubated eggs. These are white, spotted chiefly about the larger ends with various shades of brown, violet-gray and blackish and measure 23×16.2 , 23.5×16.3 millimeters. In the Greater Antilles this species usually lays three eggs.

ANTILLEAN BANANAQUIT, *Coereba flaveola dominicana*.—A nest of this bananaquit, found on March 30, 1936, is the usual globular structure of rootlets, strips of bark and plant fibers. It was situated nine feet above the ground in an orange-tree and contained three fresh eggs which are white, heavily but indistinctly marked with grayish brown, these markings confluent at the larger ends. The eggs measure 16.1×12.3 , 16.6×12.7 , 17×13.4 millimeters.

GOLDEN WARBLER, *Dendroica petechia ruficapilla*.—A nest of this Golden Warbler was situated ten feet above the ground in a small bay-tree. It is composed of plant fibers and plant down, lined with grass stems, horsehair and feathers. The two slightly incubated eggs, collected on May 6, 1935, are handsomely spotted with brown and violet-gray, the markings heaviest about the larger ends; one egg has a few blackish spots and scrawls. They measure 17.9×13.4 , 18.3×13.3 milli-

meters. Both nest and eggs are typical of those of any of the Golden-Yellow-Man-grove Warbler *formenkreis*.

PLUMBEOUS WARBLER, *Dendroica plumbea*.—A nest of this interesting warbler, containing two fresh eggs, was taken on May 11, 1935, by Mr. Agar. It was situated in a bush six feet above the ground and was well hidden by vanilla vines. It is a loosely built cup, composed of dead leaves, held together by rootlets, and is lined with dry grass stems. One egg is white, lightly spotted with reddish brown, the markings confluent at the larger end. The other egg is white, indistinctly marked with grayish brown and lavender-gray (17.5×13.8 , 18.5×13.7 millimeters).

Comparison of the nest of this species with that of *Catharopeza bishopi* of St. Vincent may prove of significance by indicating relationship between the two species.

LESSER ANTILLEAN EUPHONIA, *Tanagra flavifrons*.—This species, according to Verrill, builds in a hole of a tree, the nest being constructed of "sticks." He further states that the eggs are white, "sometimes slightly spotted." I consider this, however, highly doubtful.

A nest, containing four eggs, said to be that of this euphonia, was taken on April 23, 1933, in St. Lucia by Mr. Stanley John, of Castries, and is now in the collection of The Academy of Natural Sciences of Philadelphia. This nest was situated about thirty feet above the ground, attached to a vine growing against the trunk of a forest palm. It is composed externally of moss and rootlets with an inner cup of dried grasses, shreds of bark and rootlets. The one egg that was saved is white, speckled with reddish brown, with a heavy wreath of this color about the larger end; it measures about 19.5×13.5 millimeters. I now feel convinced of the correct identification of this nest, particularly after examining eggs of this genus in the Smooker Collection in Trinidad.

LESSER ANTILLEAN GRACKLE, *Holoquiscalus lugubris guadeloupensis*.—Mr. Agar sent a nest and eggs of a grackle from Dominica but, as no member of the genus *Holoquiscalus* had ever been taken here, I had to ask him to send specimens for identification. This he has done, establishing the identity of Dominican birds as *guadeloupensis*. He states that grackles appeared in Dominica about 1916, possibly as a result of the hurricane of that year. He further states that these birds first became established at the 'Hillsborough Estate,' near the village of Layou, and are gradually spreading along the coast. This grackle, known to natives of Dominica as the 'Layou Bird,' has also extended its range in recent years to Montserrat and Antigua, being now known from Antigua, Montserrat, Guadeloupe, Marie Galante, Dominica and Martinique.

The nest is a bulky cup of plant fibers and rootlets, with a lining of grass stems. It was situated on a branch of a silk-cotton tree forty to fifty feet above the ground. On May 21, 1936, the nest contained three fresh eggs, in color pale greenish, washed here and there with violaceous pink and heavily scrawled with black and lavender-gray. They measure 27×19 , 27×19.1 , 27.3×19 millimeters.

ANTILLEAN SALTATOR, *Saltator albicollis*.—A nest of this saltator is a very roughly built cup of weed stems, strips of bark and dead leaves, lined with fine rootlets. It was situated in a small bay-tree nine feet above the ground. The two eggs, which were fresh when collected on May 17, 1935, are light greenish blue, spotted and scrawled at the larger ends with black; there are no markings elsewhere on the eggs, which measure 27.4×18.4 , 30.3×19.7 millimeters. Ober, who also took eggs of this species, stated that two to three eggs comprise the usual complement.

Bangs has noted that a large series of this species shows that birds of Guadeloupe and Dominica are darker than those from Martinique and St. Lucia. Individual specimens from Dominica ("*Saltator albicollis guadeloupensis*") are, however, as pale as or paler than many specimens from the more southern islands and for this reason I consider a northern race unworthy of recognition.

BLACK-FACED GRASSQUIT, *Tiaris bicolor omissa*.—A nest of this grassquit was found on May 16, 1936. It was situated in a tuft of long grass and contained three incubated eggs. The nest is the usual globular structure of grasses with the entrance at the side, near the top. The eggs are white, speckled and spotted with grayish brown and, to a lesser extent, with lavender-gray, the markings heaviest at the larger ends. They measure 17.2×13.3 , 17.2×13.6 , 17.7×12.9 millimeters.

LESSER ANTILLEAN BULLFINCH, *Loxigilla noctis dominicana*.—A nest of this species is a bulky, domed structure of rootlets, dead leaves and plant fibers with the entrance at the side. It was situated in a 'poix-doux' tree, twelve feet above the ground. The three eggs, which were fresh when taken on April 11, 1936, are white, spotted with chocolate-brown and underlying markings of violet-gray, these markings forming, more or less, a wreath about the larger ends. They measure 20.7×15 , 20.9×15.1 , 22×15.5 millimeters.

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A STUDY OF THE DOWITCHERS

BY H. B. CONOVER

RECENTLY, in connection with some other work, the writer made a thorough examination of the dowitcher specimens in his own collection and that of Field Museum. As the latter now contains a very fine series of skins from the Bishop Collection, something over three hundred specimens were available for study. In addition, fifty-two others were borrowed, for which I am indebted to Alden H. Miller of the Museum of Vertebrate Zoology, Robert T. Orr of the California Academy of Sciences, W. E. Clyde Todd of the Carnegie Museum, and Earl Wright of the Chicago Academy of Sciences.

My study has led me to believe that Rowan (Auk, 49: 14, 1932) was right in considering *Limnodromus scolopaceus* a distinct species, and also in naming the form *hendersoni*. As he says, it is this latter race, breeding from Alberta to Churchill on Hudson Bay, that seems to have caused a great deal of confusion, since examples of this interior breeding form often have been identified as *scolopaceus*. This has caused the belief that the Long-billed Dowitcher is more variable in size and coloration and much more numerous than it really is. Orr (Condor, 42: 61, 1940) has found that in California only about one out of five examples is *scolopaceus* and the specimens in Field Museum give a ratio of about one to four for North America as a whole. Out of two hundred and eight specimens in spring and summer plumage taken from the Atlantic to the Pacific and from the Gulf of Mexico to Alaska, fifty-three are examples of the Long-billed Dowitcher and twenty-one of these were taken on the breeding grounds in Alaska. Of one hundred and eleven specimens in immature plumage thirty-five are *scolopaceus*, and twenty-two of these are from Alaska, one each from British Columbia, Colorado and Connecticut, four each from California and Illinois, and two from Alberta.

My reasons for considering *scolopaceus* a distinct species can be stated as follows:—(1) the fact that the immature and downy plumages (as well as that of the summer adult) of *scolopaceus* are very different from those of *hendersoni* and typical *griseus*; (2) the much greater contrast in length of bill between the sexes than in birds of the *griseus* complex. In adults of *scolopaceus* the average for females is 72.5 millimeters, and for males 62.2 millimeters. In *hendersoni* it is for females 62.9, males 57.2; and in typical *griseus* females 60.9, males 56.4.

That there should be two distinct species of dowitchers inhabiting North America seems no more surprising than that there are two species of Yellow-legs or of Semipalmated Sandpipers. In fact the relationship between *Ereunetes maurii* and *E. pusillus* in many ways appears to be similar to that between *Limnodromus scolopaceus* and *L. griseus*. Both *maurii* and *scolopaceus* are western forms, breeding only in Alaska, appearing in migration mainly in the West but also more or less regularly in the interior and more rarely on the eastern seaboard. Also like *scolopaceus*, *maurii* in winter dress is difficult to distinguish from its relative except by the form of the bill.

The characters of the different forms are as follows:—

LIMNODROMUS SCOLOPACEUS (Say). Long-billed Dowitcher

In breeding plumage this species differs from *hendersoni* by being much darker dorsally. This is due to the fact that the buff edgings and barrings of the feathers are much narrower and redder especially on the scapulars and tertials. The tail-feathers are darker, the light barrings being narrower and the dark bars wider, but this character is sometimes approached by examples of the other forms. Ventrally the salmon color of the under parts is about the same, but the dark spots in *scolopaceus* are confined to the throat and upper breast and take the form of short bars rather than dots. The spotting is heavier than in *hendersoni* and the flanks also are more heavily barred.

This form is also darker above than typical *griseus* but perhaps not so extensively. Underneath, however, it is much redder, as the Eastern Dowitcher has the lower breast, belly, flanks and under tail-coverts whitish rather than salmon, and the reddish color of the upper breast and chest is generally paler. In *griseus*, while the spotting is confined to the same area as in *scolopaceus*, it is in the form of round dots rather than bars. Both forms have the flanks barred.

The above characters will serve to distinguish adults of *scolopaceus* from early spring to early fall, and sometimes even later as the tertials seem to be among the last feathers to be molted. However, during the time the bird is in full winter plumage, adult females can be told by the length of the bill which runs 68 millimeters or more against a maximum of about 66 millimeters in the *griseus* group. Males can generally be told by the darker tail, as can the females, but as stated this character does not always hold good. *Limnodromus griseus fasciatus* Brodorb (Proc. Biol. Soc. Washington, 46: 124, June 30, 1933) appears to be a synonym; Say's measurement of $2\frac{3}{4}$ inches (70 millimeters) for the culmen of his bird places it as an example of *scolopaceus* and not of *griseus* nor of *hendersoni*.

In the immature plumage this species can always be distinguished by the much sparser light markings of the scapulars and tertials (in four immatures collected in the middle of October, these tertials are still present, although the birds otherwise are in first-winter plumage). In *scolopaceus* this reddish-buff marking is narrow and confined to the edge of the feather (in the longer or outer tertials the edgings are sometimes almost obsolete) except that in about one specimen out of five, there is an occasional indistinct light bar just back of the tip. In immatures of the *griseus* complex, however, the light edging is wider and there is besides about the middle of the web another buff line running parallel to this edge. Light bars are also present at times. In July and August specimens from Alaska all the light markings of the upper parts are redder than in specimens of the short-billed forms, but in September examples this red has faded somewhat. The tail in *scolopaceus* is darker and the sides of the face and neck are grayer.

Newly hatched specimens of the Long-billed Dowitcher from Alaska are very distinct from downies taken in Alberta and at Churchill, Manitoba, and can be distinguished at a glance. The upper parts of *scolopaceus* are dark chocolate, much darker than in *hendersoni* which is more reddish; and the light dots are *silvery gray* as against creamy white. The Alaskan downies have a narrow *silvery-gray* superciliary stripe running from above the eye to the nape, whereas in the more southern breeding birds this stripe is creamy white and much wider. Below, *scolopaceus* is darker with the center of the belly dusky (not white). Available for study were seven downy young from Alaska, three from Alberta and three from Churchill.

Range.—Known to breed in the Arctic from Franklin Bay, Mackenzie, west to Point Barrow and south to Point Dall, Alaska. In migration, commonest on the Pacific coast and the western part of the continent, but occurs throughout the interior and more sparingly on the eastern coast. Specimens were examined from Alaska (Point Barrow, Hooper Bay, St. Paul Island, Nome), British Columbia, Alberta, Saskatchewan, California, Texas, Colorado, Illinois, Connecticut, North Carolina and Lower California.

Supposed to winter as far south as Ecuador, Cuba and Jamaica. However, Chapman in reporting on Ecuadorian specimens gives a maximum bill measurement of 66 millimeters for females. It may be that this species does not winter as far south as does *griseus*.

LIMNODROMUS GRISEUS HENDERSONI Rowan. Inland Dowitcher

Differs from *scolopaceus* in breeding plumage, as stated under that race, in having the upper parts much lighter, and the dark spots on the under side round, very sparse and scattered widely, not concentrated on the chest.

The most outstanding differences between this form and typical *griseus* are found in the coloration and spotting of the under parts. In *hendersoni* the entire ventral surface is salmon-colored, with perhaps a little white on the center of the abdomen and vent, while the spotting is rounded, sparse and scattered over the entire under surface. In fact in some extreme examples the spotting is almost absent. The barring on the sides and flanks also is generally very light. In *griseus*, however, the lower breast, belly, flanks and under tail-coverts are white or only lightly tinted with salmon, and the spotting is rounded, very heavy and confined to the lower throat, chest and upper breast. The sides and flanks also are more heavily barred. Rowan speaks of the upper parts of *griseus* as being much darker than in *hendersoni*, but I cannot quite agree with this. In fact, in fresh unworn spring plumage they are perhaps grayer on the back of the neck and top of the head, but this seems to disappear before the end of May. The rest of the upper parts is perhaps slightly darker, because the buff markings average redder and narrower. However, the coloration of the upper parts in these two races does not seem to be a very good diagnostic character. In winter plumage *hendersoni* and *griseus* are indistinguishable.

In immature plumage examples of the *griseus* complex can easily be separated from those of *scolopaceus* by the differences as stated under the latter species. It does not seem possible, however, to separate examples of typical *griseus* from those of *hendersoni*. Specimens taken on the West Coast seem on the average to have the chest more heavily speckled with fine dusky spots and to be less buffy, but on the other hand one of the least speckled and most buffy specimens examined was taken on July 30 at Beaverhill Lake, Alberta, just south of one of the known breeding grounds of *hendersoni*.

In the downy plumage, examples from Alberta proved to be somewhat darker than those from Churchill. They were redder, less yellowish. This is especially noticeable dorsally.

Range.—Specimens examined from Alberta, Manitoba, California, North Dakota, Illinois, North Carolina, South Carolina, Texas and Costa Rica.

Rowan (in litt.) states that Devil's Lake, Alberta, is the type locality

and that the type specimen is in the National Museum of Canada, Ottawa, Ontario.

LIMNODROMUS GRISEUS GRISEUS (Gmelin). Eastern Dowitcher

The outstanding feature of this form in breeding plumage is its white lower breast, belly and under tail-coverts and its dense *rounded* spotting which is confined to the lower throat, chest and upper breast.

In immature plumage, like *hendersoni*, it can be separated from *scolopaceus* by the much more heavily marked scapulars and tertials.

The downy plumage is unknown but judging from the differences between newly hatched young from Alberta and Manitoba, it probably will prove to be lighter (yellowier) than either.

Intermediates between typical *griseus* and *hendersoni* are to be found. A female from Churchill (egg ready to lay) has the upper breast heavily spotted, the sides well barred and the abdomen whitish. An April bird from California has the throat and center of the chest immaculate salmon, but the sides of chest heavily spotted, the flanks strongly barred and the center of the belly whitish. A May specimen from North Carolina is similar but with a few fine dark spots on the lower throat.

Four birds from California shot on April 25 of the same year are typical *griseus*, so it seems to wander to the West Coast occasionally.

Range.—Specimens examined from James Bay, Nova Scotia, Massachusetts, Connecticut, New York, North Carolina, South Carolina, Georgia, Florida, Virgin Islands, California and Maranhao, Brazil. Probably nests east of Hudson Bay in the interior of the Labrador Peninsula.

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NOTES ON THE GENUS *CORACINA*

BY S. DILLON RIPLEY

It has recently been my pleasure and privilege to work with Dr. Ernst Mayr on various forms of the Campephagidae collected by the Whitney South Sea Expedition of the American Museum of Natural History in New York. While studying the species *Coracina caledonica*, I was struck by the confusion existing in the present-day arrangement of the genus. It is only necessary to refer to the recent work of Mathews (1930) and Hachisuka (1935). I have attempted, therefore, to construct an arrangement, based on the probable lines of speciation within the genus, which I hope will prove to be satisfactory. To Dr. Mayr, who has been most generous with advice and help, I am indebted for assistance on this paper, as well as to Mr. J. L. Peters, who has kindly read the manuscript. The present revision is not concerned with the African species of the genus.

The name *Coracina* is now generally accepted for this genus. Oberholser (1932) supports *Graucalus*, but his contention is not upheld by the International Code, nor is that of Mathews (1930). Sharpe (1879) has given a key to separate the genus *Artamides* from *Coracina*, in both of which some of the forms of *caledonica*, for example, have been listed. One of the distinguishing characters used is whether the culmen is longer or shorter than the tarsus. If this were a valid distinction, races from nearby islands would have to be separated under different genera, which could only add to the confusion. Thus *Artamides* must be abandoned as well as *Paragraucalus*, *Ptiladela* and *Celebesica*.

The forms of the genus *Coracina* vary greatly in size. All are characterized, however, by a rather strong, notched bill, about as long as the tarsus; small, weak feet; and the following somewhat varying color characters: upper parts usually gray, varying somewhat in intensity; lower parts dark gray to white or barred blackish on white; lores and sometimes parts of the head darker than the rest of the body, often glossy black; tertials with blackish inner and paler outer webs; under wing-coverts of a different color from the under parts; iris yellow in some species, in others reddish or blackish brown.

The genus differs from *Lalage* by larger size throughout, stronger bill, coarser, harder plumage, different pattern of coloration on the wing, and by the lack, except in *bicolor*, of a well-defined difference between the colors of the upper and under parts. From *Edolisoma*

it differs by comparatively larger size, stronger bill, different color pattern on the wing, and by having almost no difference between the plumages of the male and female.

HISTORY OF THE GENUS

The origin of the Asiatic forms of *Coracina* must be looked for somewhere within the continental borders of the Oriental region. From the mainland several well-defined branches have spread out over the chains of islands into the Australian area. One branch, having spread over southern Asia, has utilized the Sunda chain to pass into Australia and Melanesia. A second, moving out in two waves, the earlier a mountain form of the Greater Sunda Islands, the later a lowland and small-island form, has spread north through the Philippines and from there to New Guinea and northern Melanesia. The third main branch is today confined to the Moluccas, the Papuan area, and Australia.

From the speciation evidence afforded by the group as a whole it seems as if there had been several centers at which evolution had proceeded more rapidly than elsewhere. These areas, agreeing with other distributional evidence (*vide* Wallace, Rensch, Stresemann, Mayr), are found to be (a) the Greater Sunda Islands, (b) the Philippine area, (c) Celebes, and (d) Papua. Certain groups of species seem to have rather well-defined affinities, and for them I propose to set up three superspecies (for a definition of this term see Mayr, 1931) named in each case after the oldest specific name of the group. This results in the following arrangement:

Caledonica SUPERSPECIES

1. *Coracina novaehollandiae* including *macei*, *javensis*, *floris*, *personata* formerly considered separate species. Range: continental Asia from India to southeastern China south through Indo-China, Siam, Shan States, and Ceylon, the Andamans, Formosa, and Hainan, the Greater and Lesser Sunda Islands, Australia and Tasmania.
2. *Coracina fortis*. Range: Buru Island, Moluccas.
3. *Coracina atriceps*. Range: Ceram and Halmahera, Moluccas.
4. *Coracina pollens*. Range: Timor Laut and Kei Island, Moluccas.
5. *Coracina caledonica*. Range: New Caledonia and islands of the Loyalty, New Hebrides and Solomon groups.

Striata SUPERSPECIES

1. *Coracina larvata*. Range: Greater Sunda Islands (mountains).
2. *Coracina striata*, including the species *sumatrensis*. Range: lowlands of Greater Sunda and outlying islands.

3. *Coracina schistacea*. Range: Sula Islands off Celebes.
4. *Coracina lineata* including the species *axillaris*. Range: northern and eastern New Guinea, Numfor Island, New Ireland, Solomon Islands, eastern Australia.

Papuensis SUPERSPECIES

1. *Coracina leucopygia*. Range: Celebes.
2. *Coracina papuensis*. Range: Moluccas, New Guinea to Solomon Islands, and northern tropical Australia from northern Queensland to northwestern Australia.
3. *Coracina robusta*. Range: Queensland, New South Wales, and Victoria, South Australia.

There are a few other forms of *Coracina* which do not fit readily into these groups. I shall reserve discussion of them until a later point in the paper.

Caledonica SUPERSPECIES

In this group I have included several species, all of which are uniformly large (wing: 150–210 mm.), with moderately long tails (70–85% of wing length). The adult-male plumage is gray or slate-colored on the upper and lower parts with solid-colored under wing-coverts (slightly barred in one case). The under tail-coverts are white, gray or slate. There is usually a blackish loreal streak and some forms have the black extended over the crown or on the chin or throat generally. The wings and tail are black. The rectrices are tipped with white in varying intensity except for the two central ones which are almost always of a grayish coloration. The two exceptions to this are *pollens* and *caledonica*, the blackish slate-colored species.

The adult female resembles the male in general coloration, but lacks the black on the head and throat, and, in some forms, even the black loreal streak. In the white-bellied forms, there is a tendency for the females to have more or less barring on the lower breast and abdomen.

Coracina novaehollandiae.—The assemblage of species which I have lumped together as *novaehollandiae* has been known under at least four separate names. At first sight this action may seem somewhat drastic, but careful examination of the series in the American Museum's very extensive collection has convinced me that it is necessary in order to indicate the real relationships involved.

Coracina macei with its races is a widely extended species with the extremes of variation represented by *macei* and *larvivora*. *C. macei*

not only lives presumably somewhere near the ancestral home of the genus, but also probably resembles fairly closely the ancestral type of this species. For a careful description of these races see Sharpe (1879: 34). In general, it is sufficient to say that the male plumage of *macei* is rather unspecialized, gray above and on the throat and breast, with some barring on the whitish abdomen. In contrast, *larvivora* is a much more specialized form with black lores, sides of head and throat, and without barring. When the intervening races are examined, it is found that most of them differ much more widely from *macei* than they do from each other. Actually, *larvivora*, for example, resembles *floris* from the Lesser Sunda Islands more closely than it does *macei*. *C. floris* is somewhat darker, the black on the throat is more glossy, but otherwise the birds are strikingly similar. Unfortunately, between Sumbawa, the westernmost island in the range of *floris*, and the upper Malay Peninsula, the nearest range of a race of *macei*, there is a gap which can only be closed by assigning to *novaehollandiae* the two races of the former species *javensis*, viz., *larutensis* from the Malay Peninsula and *javensis* from Java and Bali. These two races resemble *macei* more closely than they do any of the other forms. The male and female are almost uniform gray in color with occasional light barring on the belly or under wing-coverts. The black loreal streak is only indicated.

Summing up, therefore, the evidence for and against the inclusion of these birds in one species, I should like to point out the following considerations: (a) the absence of *javensis* and *larutensis* from Sumatra and Borneo, although peculiar, is far from unique (Dammermann, 1929); (b) the absence of a *Coracina* from Lombok is paralleled by another 'Mittelland' species, *Zosterops palpebrosa* (Stresemann, 1939), and is perhaps explainable by the fact of Rinjani's devastating eruption (Rensch, 1936); (c) *C. javensis* and *macei* have already been united by Kuroda and others without, however, considering the possible further extension of these birds to the southeast.

In conclusion, I may point out that the distribution of these birds from continental Asia through the islands is a natural one, that the resemblances between the birds of Lesser Sunda and Australia and those from the mainland of Asia are too great to remain unrecognized, and that *javensis* and *larutensis*, although perhaps hold-overs from an earlier typical *macei* wave, are still links in a chain showing clearly the line of distribution of this species.

From Sumbawa to the east there is little change in the appearance of these birds. *C. personata* from Timor differs only in a slight increase of melanin pigment in the plumage, but retains the white



TEXT-FIG. 1.—Distribution map of the *caledonica* superspecies showing the range of:
 *Coracina novaehollandiae* and its races: 1, *macei*; 2, *nipalensis*; 3, *siamensis*; 4, *rex-pineti*; 5, *layardi*;
 6, *andamana*; 7, *larvivora*; 8, *larutensis*; 9, *javensis*; 10, *floris*; 11, *sumbensis*; 12, *alfredianus*; 13, *subpallida*;
 14, *melanops*; 15, *novaehollandiae*. + + +, *Coracina fortis*. —, *Coracina atriceps* and its races: 1, *atri-*
ceps; 2, *maguirostris*. . . ., *Coracina pollens* and its races: 1, *unimodus*; 2, *pollens*. - · - ·, *Coracina cale-*
donica and its races: 1, *caledonica*; 2, *lifuensis*; 3, *seiuncta*; 4, *thileni*; 5, *welchmani*; 6, *kulambangrae*;
 7, *bougainvillei*.

under wing- and tail-coverts. All the forms are representative. There is one case of apparent overlapping from Timor to the Little Kei Islands, but it is now known that the specimens of the Australian race, *subpallida*, found on these islands are winter visitors, not residents, as hinted by Hellmayr (1914). The remaining races of this species are found in Australia. In contrast to *personata*, they are paler in general color, one race, *subpallida*, being the palest of any of the subspecies, quite whitish gray. All, however, vary principally in coloration only, not in pattern or structure.

Coracina fortis and *atriceps*.—I have not included the species *fortis* from Buru in *novaehollandiae* as there have been no specimens for comparison. Salvadori's description, however, indicates that this bird might be included within *novaehollandiae*. *C. atriceps* from Ceram and Halmahera is next to *fortis* in range and presumably differs from it only in the character of a black crown. Otherwise, *atriceps* resembles *novaehollandiae* most closely, having like that species, white under wing- and tail-coverts. A tendency to a solid black crown is inherent in the superspecies as a whole, as demonstrated by specimens of typical *novaehollandiae* in which the black of the forehead extends back for some distance over the crown, and in far-away *kulambangrae*, a race of *caledonica*, in which the crown is of a somewhat darker cast than the back. The final status of *atriceps*, however, must await a critical examination of *fortis*, the intervening link in the chain of distribution.

Coracina pollens and *caledonica*.—These two species are without doubt offshoots of *novaehollandiae*, but have become so suffused with melanin as to have changed substantially. The under wing- and tail-coverts of both are blackish or slate-colored. Together the two species are so close to each other that positive identification would not be an easy matter, but the gap in their range is so great as to indicate that they are only parallel offspring of the same parent stock.

To express better the variations within this superspecies I have drawn up the following chart:

COLOR VARIATIONS IN THE *Caledonica* SUPERSPECIES

♂ Adults	General coloration	Crown	Throat	Under wing-coverts	Under tail-coverts
<i>macei</i>	gray	gray	gray	white (some barring)	white
<i>larvivora</i>	gray	gray	black	white	white
<i>larutensis</i>	gray	gray	gray	grayish with barring	white
<i>floris</i>	gray	gray	black	white	white
<i>personata</i>	dark	gray	black	white	dark
<i>subpallida</i>	gray	gray	black	white	gray
	whitish				white
<i>atriceps</i>	gray	black	black	white	white
<i>pollens</i>	slate	slate	black	slate	slate
<i>caledonica</i>	slate	slate	slate	slate	slate
<i>bougainvillei</i>	slate	blackish slate	black	slate	slate

Striata SUPERSPECIES

This group consists of several species ranging from the Andamans and Greater Sunda Islands through the Philippines, New Guinea and the Solomons. The members of this superspecies are a good deal smaller than those of *caledonica* (wing 120–170 millimeters). The tail length shows a much greater range of variation, from 62–88% of the wing length.

The plumage of the adult male ranges from gray to brownish gray or slate on the upper and lower parts, occasionally barred on the abdomen and vent, on the rump in one case, with black on the lores, sometimes extending over the crown and throat. The under wing- and tail-coverts are gray, sometimes barred gray or black on white. The wings and tail are much as in the preceding group except that the two central tail-feathers are usually black.

The adult female resembles the male in general coloration, but is usually heavily barred on the lower breast and abdomen with black on white. The under wing- and tail-coverts are barred, also, except in one or two cases, and the rump is often barred. Several members of this group have a yellow iris, a character which tends to disappear in those species lacking pronounced barring.

One species, *larvata*, which I have included in this group, is a montane one extending through the three Greater Sunda Islands.

Many members of the species *lineata* also are found up to five thousand feet throughout the Papuan area. The third species of the group, *striata*, is a lowland one found in secondary growth and on small islands in the Greater Sunda area. Thus all the species of this group are representative in range, even though two of them occur on the same islands.

Coracina larvata.—This species is characterized by dark-gray plumage, a good deal of black on the head and throat, and dark under wing-coverts in the male; the female lacks the dark throat of the male and has barred under wing-coverts and, occasionally, some barring on the vent. Immature birds have very pronounced barring on the under wing-coverts (a fact which Kuroda included in his description of the adult male, 'Birds of Java,' 1: 181, 1933). Kuroda (l. c.) included *personata* and *parvula* in this species, a grouping which serves to indicate the confusion existing in most of the arrangements of this genus. This species does not appear, on the surface at least, to be closely related to the other members of the group, but the following facts point toward its inclusion within this superspecies: (a) the position of *larvata* is representative with reference to *striata*; this location (montane) indicates that it belongs to an earlier wave of the common *striata* ancestor; (b) *C. larvata* resembles closely two races of *striata*, *guillemardi* and *mindorensis*, from the Sulu Islands and Mindoro, and *schistacea* from the Sulu Islands; (c) Raven (1935) points out that Mindoro and the Sulu Islands are remnants of an old continental area along with the Greater Sunda Islands. These birds may then possibly represent a more ancestral type of the present-day species, *striata*; (d) thus it may well be that the original wave of the *striata* superspecies spread out over the Greater Sunda area and on through the Philippines, later to become isolated and to be pushed into outlying positions by the second wave.

Coracina striata.—The races of *striata* are fairly uniform although there are four unusual offshoots. The adult male plumage in most of the forms of this species is a uniform gray above and below, with lightly indicated white tips to the rump-feathers and the two central tail-feathers gray. The adult female resembles the male, but has barred under wing-coverts, and barring on the abdomen, crissum and vent. Of the four exceptions to this characteristic plumage, two, *guillemardi* and *mindorensis*, which are uniformly colored like the species *larvata*, have been mentioned before. The other two races deserve special mention.

C. striata dobsoni is a very dark-colored bird, brownish gray on the upper parts, with barring on the abdomen in the male plumage and

heavy barring on the whole of the under parts in the female. The iris is crimson (*vide* Stuart Baker, 1924). This bird has been confused by some authors with a race of *novae-hollandiae*, *andamana*, occurring also on the Andamans (see Stuart Baker, 1924: 346). Oberholser (l. c.) omits it from his list entirely. It was not until Neumann



TEXT-FIG. 2.—Distribution map of the *striata* superspecies showing the range of: */////*, *Coracina larvata* and its races: 1, *melanocephala*; 2, *normani*; 3, *larvata*. — — —, *Coracina striata* and its races: 1, *dobsoni*; 2, *sumatrensis*; 3, *simalurensis*; 4, *babiensis*; 5, *kannegieteri*; 6, *crissalis*; 7, *enganensis*; 8, *vordermani*; 9, *bungurensis*; 10, *difficilis*; 11, *striata*; 12, *mindorensis*; 13, *panayensis*; 14, *cebuen-sis*; 15, *hochii*; 16, *guillemardi*. . . ., *Coracina schistacea* and its races: 1, *petersi*; 2, *schistacea*. - - - -, *Coracina lineata* and its races: 1, *axillaris*; 2, *maforensis*; 3, *sublineatus*; 4, *nigrifrons*; 5, *malaitae*; 6, *solomonensis*; 7, *ombriosus*; 8, *makirae*; 9, *gracilis*; 10, *lineata*.

named *andamana* (1915) that the existence of the two separate species on these small islands was definitely ascertained. Whistler (1940) has recently named this form *andamanensis*, evidently overlooking Neumann's description. This fact is a good illustration of the division that exists between the two superspecies, *caledonica* and *striata*.

C. striata vordermani, a race from Kangean Island, although belonging to *striata*, has two characters (barred under tail-coverts in the

male, and whitish under tail-coverts in the female), that are found otherwise only in the *caledonica* superspecies. This occurrence of similar characters in different superspecies of *Coracina* is not unique, as will be shown later, and is a good illustration of parallelism in different species.

Coracina schistacea.—The Sulu species is one that some authors (Mathews, 1930) would include with *personata* as being similar to *pollens*. This species is like *pollens* in having a suffusion of melanin in the plumage but except for this it seems to me to be much closer to *guillemardi*, having like it the central tail-feathers black, not slate as in *pollens*. Likewise, the species *fortis* from Buru would have to be considered its nearest relative rather than *pollens*, a fact that, in view of the contrast in plumage between *fortis* and *schistacea*, seems highly unlikely.

Coracina lineata.—This is a species (type of the genus *Paragraucalus* Mathews) which shares many common characters with *striata*, such as barred under parts in the female, barred under wing-coverts, and a yellow iris. There can be little doubt of its relationship to this group, but the gap in distribution, the long isolation and different environmental associations of *lineata* make it impossible to put it in any closer relationship. The species is characterized in the adult male by uniform bluish-gray plumage above and below, with a black loreal streak and blackish tail. The under wing-coverts are finely barred. A chart of the varying plumage characteristics follows:

COLOR VARIATIONS IN THE *striata* SUPERSPECIES

♂ Adults	Iris	General coloration	Crown	Throat	Under wing-coverts	Under tail-coverts	Belly
<i>larvata</i>	brown	gray	gray	black	gray	gray	gray
<i>melanocephala</i>	brown	gray	black	black	gray	gray	gray
<i>dobsoni</i>	crimson	dark brownish gray	gray	gray	barred	barred	barred
<i>striata</i>	yellow	gray	gray	gray	barred	barred	gray
<i>kockii</i>	yellow	gray	gray	barred	barred	barred	barred
<i>guillemardi</i>	brown	slate	slate	blackish slate	blackish slate	blackish slate	slate
<i>schistacea</i>	brown	slate	black	black	blackish slate	blackish slate	slate
<i>lineata</i>	yellow	gray	gray	gray	barred	barred	barred
<i>maforensis</i>	yellow	bluish gray	bluish gray	bluish gray	barred	barred	barred
<i>axillaris</i>	yellow	gray	gray	gray	barred	gray	gray
<i>nigrifrons</i>	yellow	bluish gray	bluish gray	bluish gray	barred	gray	gray

Papuensis SUPERSPECIES

In the *papuensis* group I would place three species, *leucopygia*, *papuensis* and *robusta*, which in many ways are exceedingly similar. All are of medium size (wing 135–165 millimeters), with a relatively long tail averaging 80% of the wing length. All are dark gray above and paler below, with white belly, under wing- and under tail-coverts. All have a prominent black loreal streak. As pointed out by Stresemann (1940), *leucopygia* is obviously related to *papuensis*. This monotypic species differs from *papuensis* only by having a yellow iris and white rump-patch. The tone of the plumage is somewhat darker, and the two central tail-feathers are blackish in the adult instead of gray, but these differences are not particularly striking. The yellow iris, however, which is not otherwise found in this superspecies, must be considered as an example of parallel mutation. It remains to be seen whether at some future time these differences may be considered of only subspecific rank.

The monotypic species *robusta* from Australia resembles *papuensis* perfectly in the adult plumage, differing only in larger size and the slightly darker tone of gray on the upper and under parts. The immature plumage, however, is quite different, being characterized by a black head, throat and upper breast, and heavy barring on the abdomen. Nonetheless, the two species are representative in their respective ranges. This occurrence of widely varying plumage in *robusta* suggests that it is a condition which has been suppressed in the other two members of the group. Taken with the evidence of the distribution of this group (Moluccas, Papua, Australia and Melanesia) these two facts together point toward the conclusion that the *papuensis* superspecies has not evolved entirely independently, but rather stems from an older continental form which has become lost or redirected into another form. The forms included in the species *papuensis* are: (1) *melanolora*, (2) *papuensis*, (3) *meekiana*, (4) *angustifrons*, (5) *oriomo*, (6) *lousiadensis*, (7) *ingens*, (8) *sclaterii*, (9) *perpallida*, (10) *eyerdami*, (11) *elegans*, (12) *timorlaënsis*, (13) *mertoni*, (14) *hypoleucus*, (15) *stalkerii*.

ISOLATED SPECIES

There are seven species of *Coracina*, found in Celebes, Halmahera and New Guinea, which for the present must be considered separate from the three main superspecies enumerated above. All of these forms have been so isolated, and the conditions on the islands have evidently been otherwise so favorable for change, that it is almost

impossible to say what, if any, are the relationships of these birds. That some of these species are even members of the genus *Coracina* has in the past been open to doubt, but critical examination of all of them has convinced me that they do belong to this genus and no other.

Coracina abbotti and *C. parvula*.—Stresemann (1940: 125) lists *abbotti* as an *Edolisoma*, although he qualifies this listing by saying that the bird has no near relatives and in fact does not resemble *Edolisoma macgregori*, the little-known species from Mindanao. This is certainly true. More than this, *abbotti* hardly seems to me to resemble *Edolisoma* from any other point of view than that of size. It lacks the distinctive white patch on wing-coverts and secondaries, and the black patch on the under parts covers the throat only and does not extend on to the breast as it does in *Edolisoma*. The American Museum possesses a specimen of the very rare *Coracina parvula* from Halmahera which I have been able to examine. By comparing these birds it at once becomes apparent that the mysterious *Coracina abbotti* from Celebes is in fact a *Coracina* and a close relative of *parvula*. This form from Halmahera, formerly considered a subspecies of *personata* (*vide* Mathews), is a much smaller bird, with a different type of plumage of a finer, softer texture, and with the upper parts a different shade of gray. Both these characters are similar to those of *abbotti* which also has a black throat and white under wing-coverts. The only real differences between the two species are that *abbotti* is white on the breast and abdomen where *parvula* is gray, and has a good deal shorter wing in proportion to its size. A chart of the characters follows:

COLOR VARIATIONS IN *Coracina abbotti* and *parvula*

♂ Adults	Upper parts	Throat	Belly	Wing	Tail-wing index
<i>abbotti</i>	uniform bluish gray	black	white	110	89
<i>parvula</i>	uniform bluish gray	black	gray	142.5	82

Coracina temmincki.—This species occurs on Celebes where it divides into three geographical races, with no very close relatives. The tail is nearly as long as the wing, which is short and rounded, and the suffusion of blue of a campanula shade over the gray plumage has served to remove almost all the characters which might otherwise

give some hint as to its position. If the blue could be suppressed, however, *temmincki* at once resembles the *caledonica* group. A study of the immature plumage shows the following characters when compared with a similar specimen of *caledonica*:

COLOR VARIATIONS IN *Coracina*

Immature	Tertials	Tail	Belly	Under wing-coverts
<i>temmincki</i>	subterminal spots	edged and spotted with white	barred	barred
<i>caledonica</i>	subterminal spots	edged and spotted with white	faintly barred	barred

The resemblances are there, but they are perhaps a little tenuous to do more than call attention to them. It remains for some more searching method of analysis to determine how indicative these resemblances are.

Coracina bicolor is the third of the isolated forms from Celebes. Unlike all other forms of *Coracina*, the adult male is bicolored, glossy black above with a white rump, and white below. This striking coloration, however, is not entirely successful in concealing the fact that there is a tendency to barring on the rump and under parts, and particularly on the auricular area. *C. dobsoni*, the race of *striata* from the Andamans, is the only other *Coracina* with a tendency to barring on the auricular area (*vide* Stuart Baker). This and the rest of the barring are an indication that *bicolor* might be considered a highly evolved offshoot of the *striata* group.

FORMS FROM NEW GUINEA

New Guinea has three very old aberrant forms of *Coracina*. The first, *caeruleogrisea*, containing three races, is a montane species in New Guinea and a lowland form on the Aru Islands. It has a large, powerful bill, bluish-gray general color, no barring, a black loreal streak and chin, tawny under wing-coverts, and gray central tail-feathers. In size and general coloration, it is similar to members of the *caledonica* superspecies, but such characters as the large bill, the tawny under wing-coverts and the more bluish shade to the plumage indicate that it is not very closely related. It is interesting to note, however, that the female and immature plumages of *Coracina pollens*, a member of the *caledonica* superspecies, have a tendency to tawny coloration on the under wing-coverts.

Coracina boyeri from the lowlands of New Guinea is a puzzling species for in size and in the coloration of the upper parts it exactly resembles such forms as *Coracina lineata axillaris*, a member of the *striata* superspecies from the same locality. It differs, however, very markedly in the uniform coloration of the under parts, the pale area around the bill, and the chestnut under wing-coverts. The last character and the fact of their distribution, hint at a relationship between this bird and *caeruleogrisea*. Examination of the immature plumages, however, as well as the obvious correlation of size and general coloration, incline me to the belief that this species should be considered as a highly aberrant offshoot of the *lineata* group. Thus the character of the chestnut under wing-coverts may be considered as still another example of parallel mutation in the same genus.

Coracina longicauda from the mountains of New Guinea is a species which is, I am sure, a *Coracina*. It possesses all the characters of the genus, but combines with them other characters—such as a peculiar dark-bluish sheen on the head, very fluffy, disintegrated feathers, and a rather square tail—that are not found in any other species of *Coracina*. A list of some of the characters of *longicauda*, giving the name of the species of *Coracina* which that character resembles, follows:

COLOR CHARACTERS OF *C. longicauda*

♂ Adult	Bill	Head	Under wing-coverts	Under tail-coverts	Tail
<i>longicauda</i>	short and weak like <i>papuensis</i>	black like <i>atriceps</i> or <i>melanocephala</i>	gray like <i>caledonica</i>	barred like <i>lineata</i>	black like <i>bicolor</i>

CONCLUSION

The Oriental forms of *Coracina* exhibit to a striking degree the ability to evolve along parallel lines. Thus it becomes difficult to set up a single character by which one species can be recognized or set apart from another. Certain differences do exist, however, and tenuous as they may at times appear, it is quite possible to set up standards within the genus and from these to chart out species groups or superspecies. In general, these three main superspecies show a remarkable amount of similarity in the makeup of their constituent species. Only in a few isolated cases in Celebes and Papua are there any forms which cannot be identified readily as belonging to one or other of the superspecies.

LITERATURE CITED

- DAMMERMAN, K. W.
1929. On the zoogeography of Java. *Treubia*, 11: 9.
- HACHISUKA, THE MARQUESS
1935. The birds of the Philippine Islands; pt. 4: 347.
- HELLMAYR, C. E.
1914. Die Avifauna von Timor, p. 38.
- KURODA, MARQUIS N.
1935. Birds of Java, 1: 182.
- MATHEWS, G. M.
1930. *Systema Avium Australasianarum*, pt. 2: 530.
- MAYR, E.
1931. Notes on *Halcyon chloris* and some of its subspecies. *Amer. Mus. Novitates*, no. 469: 2.
- NEUMANN, O.
1915. Neue tropische Vögelformen. *Ornith. Monatsber.*, 23: 181.
- OBERHOLSER, H. C.
1932. The birds of the Natuna Islands. *Bull. U. S. Nat. Mus.*, no. 159: 102.
- RAVEN, H. C.
1935. Wallace's Line and the distribution of Indo-Australian mammals. *Bull. Amer. Mus. Nat. Hist.*, 68: 200.
- RENSCH, B.
1936. Die Geschichte des Sundabogens, p. 127.
- SALVADORI, T.
1878. Descrizione di trentuna specie nuove di uccelli della sotto-regione papuana, e note intorno ad altre poco conosciute. *Ann. Mus. Civ. Stor. Nat. Genova*, 12: 324.
- SHARPE, R. B.
1879. Catalogue of the birds in the British Museum, 4: 7.
- STRESEMANN, E.
1939. *Zosterops siamensis* Blyth. *Journ. f. Ornith.*, 87: 161.
1940. Die Vögel von Celebes. *Journ. f. Ornith.*, 88: 121.
- STUART BAKER, E. C.
1924. The fauna of British India. *Birds*, 2: 346.

Litchfield, Connecticut

NEW BIRDS FROM THE INDO-CHINESE SUB-REGION¹

BY H. G. DEIGNAN

I

MAYR has suggested (*Ibis*, (14) 2: 313-314, 1938) that the Spotted Owls of Siam may be separable from *pulchra* (Pegu) by their greater dimensions, but has left them unnamed. My material indicates that in Siam, we are, in fact, concerned with two forms, one large and the other small. Ten specimens from the southwestern districts (north to Raheng, east to Siracha, south to Ratburi) have the length of the flattened wing from 138 to 152 millimeters; thirteen from northern and eastern Thailand, from 152 to 163 millimeters. The short-winged birds are *pulchra* (cf. Kinnear, apud Mayr, loc. cit.). The long-winged examples, agreeing in size with *indica*, but in color with *pulchra*, are here named

Athene brama mayri subspecies nova

Type, an adult male, U. S. Nat. Mus., no. 313161, collected at Udon, northeastern Thailand, March 19, 1929, by H. M. Smith.

The type specimen comes from a locality near the northeastern periphery of range and has the wing length 163 millimeters.

II

A study of the Orange-breasted Trogon of the Indo-Chinese countries has shown that birds occurring north of the Isthmus of Kra are separable from the Malayan form, *Harpactes oreskios uniformis* (Robinson), by their having a markedly longer tail.

The tails of seven adults from the Malay Peninsula south of the Isthmus measure 142-156 millimeters; of twenty-two adults from northern, eastern, and southeastern Thailand, Cochin-China, and Cambodia, 158-179 millimeters. The tail of the type specimen, from a locality near the northern periphery of range, measures 176 millimeters.

Examples in moult, or with the tail otherwise imperfect, have not been considered. I find no significant difference between the two mainland forms in coloration or in length of wing.

For the long-tailed northern race I propose the name

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Harpactes oreskios stellae subspecies nova

Type, an adult female, U. S. Nat. Mus., no. 331917, collected at Chiengdao, north-western Thailand, January 29, 1932, by H. M. Smith.

The northernmost localities on record for *stellae* (and for the species as a whole) are Mu'ang Len, Kengtung, Southern Shan States (De Schauensee), and Ban Nam Khuang, French Laos, on the Me Khong between Chiengsen Kao and Chiengkong (Delacour and Greenway). All Burmese birds, except in the southernmost districts, are probably of this long-tailed form.

III

Hume long ago pointed out (Stray Feathers, 6: 111, 1878) that "specimens of [*Rhyticeros*] *undulatus* from Cachar and Sylhet have larger bills than the largest of our extensive South Tenasserim series, and are altogether somewhat larger birds. . . ." Blanford observed (Fauna Brit. India, Birds, 3: 148, 1895) that "Tenasserim birds are smaller than those from Assam."

I find that more northern examples of this species are so much larger than the nominate birds of Java that they may properly be subspecifically separated. A series of sixteen adult and sub-adult males from Java, Sumatra, and the Malay Peninsula north to Victoria Point, have the wing length from 440 to 495 millimeters, the bill length (from nostril to tip of maxilla), 177 to 205 millimeters. Three adult males from northern Siam have the wing length from 504 to 510 millimeters, the bill length from 224 to 227 millimeters. Hume states that a male from Cachar had the wing length 528 millimeters.

Since no name seems to be available for these larger birds of the North, I propose that they be called

Rhyticeros undulatus ticehursti subspecies nova

Type, an old-adult male, U. S. Nat. Mus., no. 336836, collected at Huai Oi (14 kilometers north of Ban Pak Li), Nan province, eastern North Siam, April 4, 1937, by H. G. Deignan.

IV

I have been unable to examine topotypical material of *Cyanops australis cyanotis* (Arakan) but, according to Stuart Baker (Journ. Nat. Hist. Soc. Siam, 3: 430-431, 1919) and Robinson and Kloss (ibid., 3: 100-101, 1919), Robinson's *orientalis* (southeastern Siam) is, if not identical in every particular with *cyanotis*, at least near enough to have been synonymized therewith by those authors. I suspect, however, that *orientalis* will prove to be a perfectly valid form by its more robust bill, even if not by color characters.

From *orientalis*, the birds of northern Siam differ exactly as does *Cyanops au. stuarti* (peninsular Siam); the most obvious distinctions are the less massive bill of the latter, the rather lesser admixture of yellow in the scarlet of the malar patch, and the deeper color of the red patches above and below the ear-coverts. From *stuarti* itself, the northern birds are perhaps separable only by their greater wing length: six adult males of the former have the wing length from 73.2 to 79.1 millimeters; six adult males of the latter, from 80.7 to 86.7 millimeters. Thus the birds of northern Siam agree with *cyanotis* in wing length (and size of bill?), with *stuarti* in coloration and size of bill. I suggest that they be called

Cyanops australis invisa subspecies nova

Type, an adult male, U. S. Nat. Mus., no. 336982, collected at Pang Ma:kham Pong (foot of Doi Pha Sa:keng), northwestern Thailand, December 29, 1936, by H. G. Deignan.

I am indebted to Ernst Mayr and R. M. De Schauensee for assistance in the compilation of measurements of specimens in their charge.

U. S. National Museum
Washington, D. C.

GENERAL NOTES

Subspecific status of *Fregata minor* along the Pacific coast of North America.—Swarth (Condor, 35: 148-150, 1933), so far as known, was the first to record *Fregata minor* along the west coast of North America. The nearest previous records of occurrence for this species were the Hawaiian Islands and the Galapagos Islands; *Fregata magnificens* was the only species of the genus known from the western Mexican coast.

The specimens upon which Swarth's record is based consist of three adult males and three immatures from the Revillagigedo Islands, which are situated off the west coast of Mexico and south of the tip of the peninsula of Lower California at about 19° north latitude. Swarth, at the time, stated that no recognizable differences were apparent between the Revillagigedo series and specimens representing *Fregata minor ridgwayi* from the Galapagos Islands off the coast of Ecuador; hence he considered them as of that race.

The present writers have examined the specimens referred to by Swarth, as well as additional representatives of the species *minor* from the western Mexican coast, and fail to agree with his findings regarding the subspecific identity of these birds. There are twenty-seven skins of *ridgwayi* in the collection of the California Academy of Sciences. Comparison of the adult males from the two regions shows that the Mexican coast birds possess a predominantly purplish, rather than a greenish sheen to the lanceolate feathers of the back. One of the Mexican birds, however, is in process of molt and has but a few lanceolate feathers present on the back. These are greenish rather than purplish. It is possible that factors other than genetic ones are responsible for the color differences. The bills of the Revillagigedo specimens appear larger than those of *ridgwayi* on comparison and present a straighter outline along the culmen when viewed laterally. Furthermore, in transverse section the culmen is more rounded, somewhat resembling the species *magnificens* in this regard, rather than being flattened as in *F. minor ridgwayi*. A single immature male from latitude 14° 11' N., longitude 109° 20' W., taken on October 9, appears in bill character to be of the Revillagigedo type. What slight iridescence is present on the scapulars is purplish.

In all of the above-mentioned characters the population of *minor* from the Revillagigedo Islands shows a marked similarity to the race *palmerstoni* which occurs on Laysan Island and about the Hawaiian Islands. On comparing the adult males from the Mexican coast with four adult males of *palmerstoni* (three borrowed from the State University of Iowa, Museum of Natural History) only one slight, average difference was noted: a tendency toward a paler alar wing-bar in the former. This appears too slight to warrant any subspecific separation, hence the name *palmerstoni* is applied to the Revillagigedo Frigate-birds.

The resemblance of the western Mexican coast population of *Fregata minor* to the Laysan form, *palmerstoni*, which at its nearest breeding locality, the Hawaiian Islands, is approximately three thousand miles distant, appears strange in the case of a species which is not a pelagic wanderer. It is equally peculiar that such dissimilarity exists between Mexican coast Frigate-birds and members of the same species occurring on the Galapagos Islands, about eighteen hundred miles to the southeast.—A. J. VAN ROSSEM, Dickey Collections, Los Angeles, California, and R. T. ORR, California Academy of Sciences, San Francisco, California.

Baikal Teal on St. Lawrence Island, Alaska.—In the fall of 1937, I received, through the courtesy of Frank Dufresne, two salted duck skins taken by Alaska Game Warden Grenold Collins on July 23, 1937, at Svoonga, St. Lawrence Island, Alaska. Recently they were relaxed and made up. They proved to be a fine pair of adult Baikal Teal (*Nettion formosum*) which I believe constitute the second record for North America. Both of the specimens are in excellent plumage and I think it is fair to assume that they were a mated pair, although there is nothing to indicate whether or not they were actually nesting birds.—IRA N. GABRIELSON, U. S. Fish and Wildlife Service, Washington, D. C.

Green-winged Teal nesting in Maine.—On July 25, 1940, the junior author collected a juvenile Green-winged Teal (*Nettion carolinense*) in Hancock County, eastern Maine, which, as far as is known, constitutes the first authentic breeding record of the species for the State. That Green-winged Teal breed occasionally in Maine has been strongly suspected for three years. During the present State-wide waterfowl survey—which was initiated by the senior author in 1937, and which is now being carried out under his supervision by the Department of Inland Fisheries and Game—the number of summer occurrences of Green-winged Teal has been noteworthy. During migrations the species has been showing a decided increase in numbers for several years, a fact which has been generally apparent to field observers throughout New England and the Maritime Provinces of Canada. Knight (*The Birds of Maine*, p. 88, 1908) states that the bird is of general occurrence in limited numbers during the fall along the coast; in the interior of the State "a few may be expected in the fall, but seemingly it is not noted inland in spring, and does not breed with us." Its status has undergone a considerable change since the foregoing was written. At present, it is a common migrant in fall, on both coastal and inland waters, and it is fairly common and of regular occurrence throughout most of the State in the spring.

Most summer records of Green-winged Teal between 1938 and 1940 have been from the eastern or north-central sections of the State, chiefly in Washington County, which is in the extreme eastern part of Maine. Three adults, at least one of which was a female, were found by the senior author on Corinna Stream, in Penobscot County, on August 3, 1939. Five adults were observed by Virgil Pratt and the present writers on Big Musquash Stream, in Washington County, on June 22, 1940; a single female had been found here by the senior author on July 24, 1939. Four adults were seen by Pratt and the junior author on Harmon's Stream, Gardiner's Lake, in Washington County, on August 2, 1940. Single individuals have been recorded by the authors in the summer during these years, on Douglas Pond, in Somerset County; on West Bog, near Shirley, in Piscataquis County; on Big Lake, in Washington County; and on Winter Harbor Stream, in Hancock County.

The most regular occurrences of Green-winged Teal during the summer months have been recorded from the Pocamoonsshine-Crawford Lakes region of Washington County. On June 10, 1938, Louis Beckett and the senior author observed a single adult male on Allen Stream, a tributary of the Pocamoonsshine-Crawford chain of lakes. Later, Judge John Dudley, an associate member of the A.O.U. and a very keen observer of birds, reported that, early in August of 1938, he saw a female Green-winged Teal 'feigning injury' near the head of Pocamoonsshine Lake. Following the receipt of this report, numerous attempts have been made to establish the breeding of the species in those waters. On July 26, 1939, Beckett, Clarence

Aldous, and the senior author spent the day on Allen Stream and Pocamoonshine Lake, but although we saw an adult male and a female at the former locality, we could find no young. Numerous broods of Blue-winged Teal and Ring-necked Ducks were present in the marsh, but since some of the latter were only a few days old, it did not seem advisable to create too much disturbance by making a thorough search of the marsh. In 1940, on May 23, Beckett, Dudley, and the senior author observed five adult Green-winged Teal in this area. A female gave a brief performance of 'injury-feigning' in coming off a grassy meadow on a large island in Allen Stream, but a search for the nest was fruitless. On June 21, Beckett and the senior author spent the entire day at Allen Stream, and, although we saw an adult male and an adult female, neither a nest nor a brood could be found. On July 14, Dudley reported that, in the same general area, a female 'feigned injury' very vigorously, but he was unable to locate the brood. On July 20, Beckett and the senior author once again combed the Allen Stream marsh without finding a brood; only one adult female was observed.

It is interesting to note, in connection with the efforts to establish a breeding record in the Pocamoonshine-Crawford area, that the species breeds regularly in west-central New Brunswick, which is comparatively near eastern Maine. During a field trip with Bruce Wright, of the Dominion Forest Service, to the Portobello marsh near Fredericton on July 17, 1940, the senior author recorded seven distinct broods of Green-winged Teal and observed two other females 'feigning injury.' In fact, of seven species of ducks found breeding there, Green-winged Teal were second only to Wood Ducks in population. The Portobello marsh is only about seventy miles by airline from Pocamoonshine Lake in Maine.

The locality where breeding of the species was established by the junior author is Dead Stream, Township 33, in Hancock County. On July 25, 1940, Richard Stickney, Virgil Pratt, and the junior author found a female Green-winged Teal and a brood of six young about five weeks old. Dead Stream is a meandering waterway flowing through grassy marshland. Its shores are lined with a narrow fringe of emergent vegetation, chiefly pickerelweed (*Pontederia cordata*). The female was first observed when she 'feigned injury,' and, at that time, she was some distance from her brood. The young birds were not very much alarmed and allowed a rather close approach before attempting to escape. When fear at last compelled them to move, they resorted to diving rather than to swimming on the water's surface. One bird was collected; shooting was not necessary, for the young duck tired rapidly upon being pursued, and it was soon exhausted. The juvenile collected from the brood was made into a study skin and was sent to Arthur H. Norton, of the Portland Museum of Natural History, for confirmation of the authors' identification. It is now in the collection of the Maine Cooperative Wildlife Research Unit at Orono.

The 1940 breeding record, just discussed, appears to be the first for Maine and the second for New England. The first New England record, curiously enough, was likewise obtained in 1940. It was from eastern Massachusetts, and is reported by Griscom (Bird-lore, 42: 452, 1940).—HOWARD L. MENDALL, *Maine Cooperative Wildlife Research Unit, Orono, Maine* and JAY S. GASHWILER, *Department of Inland Fisheries and Game, Augusta, Maine*.

Ring-necked Duck breeding in Prince Edward Island and Nova Scotia.—Although Ring-necked Ducks (*Nyroca collaris*) have been known to breed rather commonly in New Brunswick, at least since 1937, it was not until 1939 that they were found

breeding in the province of Prince Edward Island. Special Constable J. S. Jenkins, R. C. M. Police, reported the finding of six Ring-necked Ducks in a pond near Avondale, Queens County, on June 23, 1939. The birds exhibited signs of protecting young so, on July 4, a search for young birds was conducted, but without success. Finally on September 20, 1939, Mr. Jenkins shot an adult female and two juvenile Ring-necked Ducks in this same pond. During my visit to Prince Edward Island in June 1940, Constable Jenkins and I found the species in two areas in Queens County and in one area in Kings County. Later, Mr. Jenkins reported the finding of broods of young in each county, so the species is increasing on the island.

In each of the past four summers I have visited favorable nesting areas for Ring-necked Ducks in Nova Scotia, but not until the past summer (1940) was I able to find evidences of their nesting in this province. On June 25, 1940, I found a female with a brood of nine small young in Patton Lake and another female with a brood of at least seven young in Tamarac Lake. Both of these lakes are in Cumberland County, but neither is much more than a mile inside the boundary of Nova Scotia. However, the ideal character of this Missiquash Marsh section which lies on the Nova Scotia-New Brunswick boundary convinces me that these birds were produced wholly within Nova Scotia. Col. H. H. Ritchie, Chief Game Warden of New Brunswick, and John Tingley, Game Warden, who accompanied me on this day support my belief.

It is very gratifying to find this species spreading into new nesting areas and continuing to increase over the past few years to become one of the more important species in New Brunswick and parts of the New England States.—HAROLD S. PETERS, U. S. Fish and Wildlife Service, Charleston, South Carolina.

Comparison of 1935 and 1940 populations of nesting Bald Eagles in east-central Florida.—In 1935, I made a survey of the Bald Eagles, *Haliaeetus leucocephalus*, nesting in southeastern Florida (Auk, 54: 296-299, 1937). On December 29 and 30, 1940, I visited the nesting sites of twenty-four pairs of eagles which were present at their nests in 1935. These nests were all located within ten miles of the Indian River between the cities of Cocoa in Brevard County and New Smyrna in Volusia County. During these five years, six of the twenty-four pairs, or 25 per cent, had disappeared from their nesting sites. Presumably these pairs had died or been killed and had not merely moved to new nesting sites (in support of this assumption see op. cit., p. 297).

In 1930, twenty-three occupied nests had been visited and when these nesting sites were revisited in 1935, seven of them, or about 30 per cent, were no longer used by eagles. During the last five years the Bald Eagle has decreased in numbers in the region considered, and the decrease has been slightly less than during the preceding five years. Of the eighteen pairs of eagles visited in 1940, ten were using the same nests they occupied in 1935, only four pairs had established new nests. The nests of two pairs were not located, which indicates they had new nests, and I could not be certain whether two nests were formerly used sites or new ones.

In addition to the twenty-four pairs whose nests were present in 1935, two nests of pairs which were not located in 1935 were found in the 1940 survey. I think these pairs were birds which had reached breeding age during this five-year period and not older eagles which formerly nested elsewhere. This is indicated by the absence of nesting eagles in the vicinity of these two nests during 1935.

To the writer this decrease in the number of eagles in this region does not mean that the species is being unduly persecuted. The factors at the root of the decrease probably are an increase in the number of people living in the area and the felling of the pines used as nesting sites.—JOSEPH C. HOWELL, *Contribution no. 78 from the Zoological Laboratory, Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma.*

Turkey Vulture in Vermont.—On August 19, 1940, while motoring through Halifax and Whitingham, Vermont, I saw near the village of Jacksonville, about three miles north of the Massachusetts line, a Turkey Vulture, *Cathartes aura septentrionalis*, flying westward slowly and unmistakably. Perhaps it was the same wandering bird as had been seen at Pelham, Massachusetts, August 4 (Margaret Morse Nice) and Squam Lake, New Hampshire, August 10 (K. W. Burke). Only two Vermont records were given by Forbush in his 'Birds of Massachusetts and Other New England States' (2: 89, 1927), and only four—and of these only one is complete, with date, locality, and observer's name—are known even now to Wendell P. Smith, the State Ornithologist. But in recent years, principally in late April, the species has been seen remarkably often in western Massachusetts, and one can predict that it will visit southern Vermont more and more frequently.—SAMUEL A. ELIOT, JR., *Smith College, Northampton, Massachusetts.*

Osprey kills itself.—On a late autumn day in 1924, Dr. Charles W. Creaser (now of Wayne University, Detroit, Michigan) and the writer observed an Osprey (*Pandion haliaëtus carolinensis*) flying over an oxbow lake off the Kaw River a few miles upstream from Lawrence, Kansas. Erratic movements of the bird attracted attention; it was being pursued by smaller birds that flew above it and made diving attacks upon it. The Osprey dodged and struck at its assailants with its feet. Suddenly it dropped downward, tumbling over and over, and fell upon the water. Floundering, it remained afloat until, after considerable delay, we had reached it in a rowboat. The bird had pierced its wing above the elbow with a claw of its left foot, and broken the humerus. The flesh of the arm had been torn and bruised by frantic, but unavailing, efforts to extricate the talon; pieces of broken bone had lacerated muscles and skin. Although still defiant toward its captors, the bird was apparently dying presumably because of shock, chill, and loss of blood.—R. CHESTER HUGHES, *Zoological Laboratory (Paper no. 77), Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma.*

Spring and winter hawk censuses from Illinois to Oklahoma.—On two trips by car in 1940—from March 8 to 20 and December 21 to 27—counts were kept of all hawks seen; my husband, although the driver, watched for birds on his side of the road, and from March 8 to 13 we had the assistance of Dr. Alfred Lewy. A summary is given in Table 1 of the total number of these birds recorded in three States during favorable weather. The return trip December 26 to 27 was made through continuous rain in Oklahoma and Illinois and no hawks were visible.

The totals for each trip—one hawk for 18.5 miles in spring and one in 16 miles in winter—do not differ much. The counts in Missouri are about the same at each season, but in Illinois hawks were twice as numerous in March as in December, while in Oklahoma, on the contrary, they were four times as numerous in winter as in spring. It looks as if the hawk population had shifted to the north in March. However, on 652 miles in Louisiana from March 9 to 17 a total of 42

TABLE 1
ROADSIDE CENSUSES OF HAWKS FROM ILLINOIS TO OKLAHOMA

	March	Mile- age	Total seen	Miles per hawk	December	Mile- age	Total seen	Miles per hawk
Illinois	8,20	658	55	12	21	264	10	26
Missouri	8,19,20	346	12	29	21,22,27	408	13	31
Oklahoma	17-19	420	10	42	22-25	403	44	9
		1424	77	18.5		1075	67	16

hawks was seen, an average of one to 16 miles (Nice, Indiana Audubon Year Book, 17: 6-13, 1940).

In December we saw no hawks on 114 miles in northern Illinois; the 10 birds on 150 miles in central Illinois (from Bloomington to vicinity of St. Louis) gave an average of one to 15 miles. In Missouri no hawks were seen on the wooded black-jack and post-oak plateau portion of route 66 through the Ozarks; the habitat is unsuitable, and the detection of birds of prey by the observer in an automobile would be difficult. The hawks were noted in the valley of the Mississippi River and in open, farming country in southwestern Missouri on route 60.

The numbers of four genera of hawks recorded are shown in Table 2.

TABLE 2
KINDS OF HAWKS SEEN IN SPRING AND WINTER

	Accipiter		Buteo		Marsh Hawk		Sparrow Hawk	
	Spring	Winter	Spring	Winter	Spring	Winter	Spring	Winter
Illinois	1	0	4	0	12	1	38	9
Missouri	0	1	2	4	0	1	10	7
Oklahoma	0	2	4	19	2	8	4	15
Total	1	3	10	23	14	10	52	31
Number per 100 miles	.07	.3	.9	2.3	1.3	1	3.7	3

At both seasons *Falco sparverius* was the most abundant hawk, constituting 67 per cent of all individuals seen in spring, and 46 per cent in winter. *Buteos* made up 34 per cent in winter, 13 per cent in spring; *Circus hudsonius* 15 per cent in winter, 18 in spring. Of the 126 hawks seen on the whole trip of 2605 miles in March, 50 per cent were Sparrow Hawks, 25 Marsh Hawks and 22 *Buteos*—Red-tails, Red-shoulders and two Broad-wings. The number of miles per hawk averaged 20.7. When we compare the number of each genus seen per hundred miles in spring and winter, we find a significant difference in the *Buteos*, for the winter population was two and a half times as high as that in spring.

In December we found a fair population of wintering hawks from central Illinois south to central Oklahoma. In March we met migrants in Illinois, but we reached Oklahoma after the winter population of American Rough-legs and many Red-tails had left for the north.

In northwestern Ohio, Hicks and co-workers (Ohio Wildlife Research Station, Releases 116, 119, 122, 124), found an average of one hawk per 36 miles in September 1938, on a total of 5314 miles and one in 22 miles in September 1939, on 2780 miles. In June 1938, they recorded one hawk in 76 miles on a total of 9330 miles and the following June one in 55 miles on a total of 22,770 miles. Hawks, of course, are much easier to see in fall, winter, and early spring than in summer.

Roadside censuses of hawks can give us valuable information as to their numbers in different parts of the country at different times of the year.—MARGARET M. NICE, 5708 Kenwood Ave., Chicago, Illinois.

Pectoral Sandpiper in North Carolina in winter.—On December 9, 1940, a male Pectoral Sandpiper (*Pisobia melanotos*) was collected at Mattamuskeet Lake, New Holland, North Carolina. The bird was in an extremely emaciated condition. While no evidence of mechanical injury was noted, the entire intestinal tract showed evidence of inflammation. It seemed obvious that the bird had been unable to proceed south at the time of the regular migration. I have, on a number of occasions, skinned belated birds and found them in the same condition, due either to disease or injury, and believe that more frequently than we suspect unusual seasonal records of migrants may be due to this cause.—IRA N. GABRIELSON, U. S. Fish and Wildlife Service, Washington, D. C.

Avocets in Maryland.—The first-known occurrence of Avocets (*Recurvirostra americana*) in the State of Maryland was recorded by the writer on September 30, 1940, on the Blackwater National Wildlife Refuge. A pair of the birds was seen on the morning of that day wading in shallow water and probing about for food at the edge of a three-square (*Scirpus olneyi*) marsh bordering the Blackwater River on the refuge and about 100 yards from the headquarters buildings. Subsequent observations on various days showed that the birds moved about quite freely, although they always remained within several hundred yards of the place in which they were first observed. They frequented a small freshwater pond nearby, and as the water was somewhat lower than usual, a good supply of small minnows and similar food was readily available. The two birds appeared to be unafraid of spectators, as on one occasion an outboard motorboat approached within about twenty feet of the birds without causing them to take flight. They remained together until October 17. On the next day, but one Avocet was observed and it remained at the same feeding grounds until November 2, 1940, when it, too, left. The writer was able to approach the two birds close enough to take a picture of them, which is now on file in the records of the Fish and Wildlife Service, Washington, D. C. Sight observations were also made and confirmed by Dr. David E. Davis, Robert W. Allen, Alan W. Souder, Robinson Watters, John H. Sutherlin, and George Tonkin.—DAVID V. BLACK, Blackwater National Wildlife Refuge, Cambridge, Maryland.

Franklin's Gull an addition to the Florida list.—Howell (Florida Bird Life, p. 474, 1932) includes the Franklin's Gull, *Larus pipixcan*, in the hypothetical list on the basis of a sight record by Pangburn (Auk, 36: 395, 1919), who reported one bird seen on February 26, 1918, at St. Petersburg. On July 1, 1937, Wm. I. Lyon banded

more than 500 Franklin's Gulls at Delta, Manitoba; one of these, number 37-516471, was reported "found" on Lake Okeechobee near Lakeport, Florida, about December 4, 1938. With this additional evidence the species should be admitted to the Florida list as a casual winter visitant.—ROBERT C. McCLANAHAN, *U. S. Fish and Wildlife Service, Washington, D. C.*

A Maryland winter record for the Black Skimmer.—At the mouth of the St. Jerome Creek, St. Mary's County, Maryland, on December 29, 1940, a flock of gulls resting on St. Jerome Point was examined from a distance of about 500 yards with a 7-power binocular and a 24-power telescope. A dark bird sitting much lower than the gulls was present and readily recognized as a Black Skimmer, *Rynchops n. nigra*. By driving around the headwaters of the creek, St. Jerome Point was reached, and a good view of the bird at less than 100 yards was obtained. So far as we are able to find, this is the first reported occurrence of the Black Skimmer in winter north of the coast of South Carolina.

Earlier in the day at Point Lookout, Maryland, a flock of thirteen Snow Buntings (*Plectrophenax n. nivalis*) was seen and two birds were collected. Probably no other field party has observed these two species, one lower austral and the other arctic, on the same day.—LUCAS DARGAN, PHOEBE KNAPPEN, AND ROBERT C. McCLANAHAN, *U. S. Fish and Wildlife Service, Washington, D. C.*

Mourning Doves of southern Florida and the Greater Antilles.—In 1933, the writer predicted (Auk, 50: 218, 1933) that the Eastern Mourning Dove (*Zenaidura macroura carolinensis*), would be added to the list of Cuban birds. This prediction was based upon the observations of Wm. W. Demeritt of Key West, Florida, then superintendent of lighthouses and a cooperator of the Biological Survey who reported that he had "recently [report dated November 18, 1932] observed over a thousand doves take their departure for Cuba." Four years later, this prophesy was fulfilled by the recovery in Cuba of two doves, both of which, appropriately enough, had been banded at Key West by Mr. Demeritt (Auk, 54: 391, 1937).

Since that time three additional Mourning Doves, banded by Mr. Demeritt at Key West (36-328645, 36-328702, and 36-328801), have been retaken in Cuba, two in the province of Habana, and the third in the province of Pinar del Rio. These provinces comprise the western end of the island. Of the five cases now available, three are of birds banded in October, one in November, while the fifth, an adult male, was banded on July 30, 1935. The dates of all recoveries are between October 22 and April 1, the case with the latest date being an adult female banded on October 17, 1937, and recovered on April 1, 1939. The recovery date of the latter bird is significant for at that time the nesting season is well advanced in the southern United States. Nests with nearly fledged young have been found near Pensacola, Florida, on April 10. It is recognized that this bird might have been an earlier victim of the hunting season in Cuba, receiving a wound that, while not fatal and from which it subsequently recovered, was sufficient to prevent a normal migratory return to the United States. Nevertheless, the record assumes additional value in conjunction with another Florida Mourning Dove (A-441887) recovered during the latter part of July 1934, at Santiago, Dominican Republic. This bird was banded at Gulfport, Florida, on March 30, 1932. The Eastern Mourning Dove has not been previously recorded from the island of Hispaniola.

In the opinion of the writer, these data are not only of unusual interest from a distributional viewpoint, but also from that of systematics. Howell in his 'Florida

Bird Life' (1932: 278-280) reviews the status of *carolinensis* in that State, and cites a single record of the western race (*Z. m. marginella*) taken at Wildwood, on February 2, 1929. In the files of the Fish and Wildlife Service, there are many cards in Mr. Howell's handwriting referring to various specimens in different collections which he had examined and subspecifically identified. Several of these deal with doves collected during the winter season at Key West and Miami. In several instances, measurements of wing, tail, and culmen are given and on one card, giving the data for a half-dozen specimens, the notation is added "all dark." While nowhere in his work (loc. cit.) does he indicate that he entertained any suspicion that either the West Indian form (*Z. m. macroura*) or the Western race *marginella*, might be of regular occurrence in Florida, the data collected by him are at least suggestive. Since size is the chief character alleged to distinguish *macroura* from *carolinensis*, while *marginella* is "similar to *Z. m. carolinensis* but averaging slightly paler, upper parts slightly grayer, and size slightly larger" (Ridgway, Bull. U. S. Nat. Mus., no. 50, pt. 7, p. 347, 1916), his studies may have been directed toward either possibility, although the identification (by Dr. Oberholser) of the Wildwood specimen as *marginella*, lends probability to his having this race particularly in mind. Thus far, however, and with the one exception above noted, all Mourning Doves collected in Florida have been identified as belonging to the race *carolinensis*.

The possibility that the West Indian form, *macroura*, is a regular but heretofore overlooked winter visitor to southern Florida would, at first thought, seem to be a logical conclusion. This deduction does not seem altogether justified for the reason that a large number of other doves banded by Mr. Demeritt at Key West, have been recovered at northern points, several as far away as Illinois. In this connection it should be pointed out that the Service files now contain more than 1800 recovery records for Mourning Doves, the points of banding being well distributed over the entire country. Birds from several northern States have been subsequently recovered in all of the southeastern States, including Florida, but in no case have they passed beyond to Cuba or any other West Indian point.

Conclusions.—From the available data it appears to the writer that a choice may be made of two conclusions, both of which are dependent upon recognition of the validity of the races of *Zenaidura macroura* that are involved: (1) The winter range of the Eastern Mourning Dove (*Z. m. carolinensis*), extends regularly to western Cuba, and occasionally to Hispaniola; on both islands it may possibly breed in which case hybridization with *Z. m. macroura* is probable; (2) The West Indian Mourning Dove (*Z. m. macroura*), is a regular resident in southern Florida, and in winter is associated with migratory representatives of *Z. m. carolinensis*.—FREDERICK C. LINCOLN, U. S. Fish and Wildlife Service, Washington, D. C.

Barred Owl on Athabaska River, Alberta.—In May 1934, in company with Luther J. Goldman of the Biological Survey, I descended Athabaska River from Fort McMurray, at the mouth of Clearwater River, to Athabaska Lake. We travelled in a small canoe, and camped each night beside the river. The purpose of our trip was to make observations on the migrating and nesting waterfowl, in a region where I had made similar studies at the same season in 1901, 1903, and 1907.

Our first camp was made on the right (eastern) bank of the river about twenty miles below Fort McMurray. Shortly before dark, among other familiar night sounds, we were surprised to hear the characteristic calling of a Barred Owl, *Strix varia*, a call that has been most aptly rendered in the form of a query: "Who cooks

for you—who cooks for you all?”. The challenge came from the forest on the opposite side of the river, perhaps a quarter of a mile away. Never before having heard the species within several thousand miles of this region we were instantly attentive, and were favored by another rendering about a minute later. We failed to hear the bird again during the night. Our next camp was made many miles below, and here we heard Great Horned Owls several times during the night, calling to each other across the wide valley, but no further note from the Barred Owl.

This fortunate observation is the basis of Mr. Bent's record for Fort McMurray, Alberta, in U. S. National Museum Bulletin 170, page 196. The note was inserted when the bulletin was in final page proof, and this circumstance precluded fuller particulars. It should be noted that this record extends the range as known at that time northwestward from the region of Lake Winnipeg, a distance of about 500 miles. Doubtless when the region is more thoroughly worked, the Barred Owl will be found to occur in the intervening area.—EDWARD A. PREBLE, 3027 Newark St., Washington, D. C.

Alder Flycatcher breeding in Philadelphia.—The Alder Flycatcher (*Empidonax traillii traillii*), regarded as a breeding bird of the Canadian and Hudsonian Zones, has this year (1940) been found nesting in Philadelphia, within city limits. The bird has been found breeding sparingly in the Poconos in northern Pennsylvania, but this locality is fully one hundred miles farther south and in the Carolinian Zone.

At the mouth of Pennypack Creek which empties into the Delaware River, there is a low swampy area of calamus, cat-tails, sedges and elderberry bushes bordered and interspersed with willow trees. In the past few years, records of the occurrence of the bird in this locality indicated that it might be breeding. It was often observed perched on a dead branch from where it sent its three-syllabled note out over the swamp at frequent intervals. It was Mr. William Yoder who first discovered the bird summering in this locality. His records are one bird on May 26, 1938, and June 21, 1938. He found another bird there on May 21, 1939, and the writer records one bird singing on August 1, 1939. Yoder's records for 1940 at this same locality are two birds on May 30 and three on June 2.

On June 15, 1940, Mr. Richard F. Miller, in company with Mr. Carl Collopy and the writer, found the nest. It was constructed of coarse grasses and was situated 22 inches up in a small elderberry bush that was four feet high and growing amid clumps of goldenrod and jewel-weed. Miller stated that the nesting site was typical of that of the Indigo Bunting. The one egg was white and marked at the larger end with light buffy blotches. On June 19, 1940, the female was observed sitting on four eggs while the male sang, perched on a dead stub about 150 yards away.—EDWARD J. REIMANN, 2261 E. Kennedy St., Philadelphia, Pennsylvania.

Hoyt's Horned Lark in Massachusetts.—For some years it has been noticed that flocks of Horned Larks, many individuals with white eyebrows and pale-yellow throats, occur at inland localities in late winter or early spring, usually just after heavy snowstorms or strong northwest winds. Inexperienced observers usually report these as Prairie Horned Larks, but definite proof that this bird would normally occur in flocks of 30 to 40 in eastern New England is lacking. For two years I have been on the trail of such flocks, have noted what I regarded as sus-

picious individuals, but have had no success in collecting specimens. From March 16, 1941, on, just after the weather conditions described above, various members of the Harvard Ornithological Club, to whom I am much indebted, reported such a flock, and on March 20, they described the conditions for observation as being so ideal that I went out to an extensive field in Concord that afternoon with Messrs. Bergstrom and Parker, after we had all studied museum series in the morning. The larks were all in one bare patch of ground by the road, and could be studied from the car window. Examples of what appeared to be three different types were collected, three of which, as hoped, proved to be the subspecies, *Otocoris alpestris hoyti*, the first record from the State. In spite of two hours' scrutiny at thirty feet, I am unable to give the percentage of Prairie and Hoyt's Horned Larks in this flock, so great are the technical difficulties in shade of color and in size. It was a simple matter to pick out the one Northern Horned Lark with its yellow eyebrows, but the size difference between the Prairie and Hoyt's could only be determined when two birds of the same sex were *motionless, side by side, and in exactly the same plane*. These conditions occurred just twice and the larger bird was shot immediately. Mostly, of course, the birds were running around, facing in different directions, or were squatting behind lumps of sod in alarm, in which case it was absolutely impossible to be sure of either color or size differences. I trust these remarks may prevent Hoyt's Horned Lark from being reported annually hereafter in this State on the basis of sight records! I am much indebted to my colleague Mr. J. L. Peters for carefully determining the larks with me. —LUDLOW GRISCOM, *Museum of Comparative Zoology, Cambridge, Massachusetts.*

American Magpie in Virginia.—On May 12, 1940, on the farm of P. J. Nixon, near Ballsville, Powhatan County, Virginia, an American Magpie (*Pica pica hudsonia*) was captured in a pole trap set for hawks. In the quest for identification the bird was delivered to Mrs. P. J. Flippen, of Ballsville, who forwarded it to the State Game Commission, where identification was made. The bird, a female, was mounted and is preserved in the Virginia State Museum of Mineral, Timber, and History. This is apparently the first recorded instance of this species in Virginia.—CHESTER F. PHELPS, *Commission of Game and Inland Fisheries, Richmond, Virginia.*

Carolina Wren in central New Hampshire.—Early in the morning of August 21, 1940, I was fortunate enough to observe an adult Carolina Wren, *Thryothorus ludovicianus*, at my summer home near Center Ossipee, New Hampshire. A room in a long shed, attached to the house, is used as a summer kitchen. I was busy at what one should be doing in a kitchen at that hour, and the large door that led to the porch was open. Suddenly a bird flew in, crossed to a large screened window on the opposite side of the room, and after fluttering there a few moments, dashed out by the way it had entered, and disappeared around the corner of the barn. The view afforded as the bird paused at the screened window left no doubt as to the identity of a species familiar to me from many years' experience in the Middle States.—EDWARD A. PREBLE, 3027 Newark St., Washington, D. C.

Bluebird mortality in 1940.—During late February and early March this past spring (1940) when Bluebirds, *Sialia sialis*, had moved north in numerous, irregular flocks, a most destructive snow-and-ice storm occurred. I was immediately cognizant of the fact that Bluebird flocks were becoming fewer and the numbers of birds decreasing daily. By the first of April normally about ninety-three per cent

of my boxes hold nests and full complements of eggs. When I made my first survey, I was not surprised to find that only forty-six per cent of the boxes contained nests.

In normal years during the second nesting, I have about fifty-three per cent of my boxes occupied. During 1940, only twenty-three per cent contained nests and eggs, which leads me to the conclusion that the past season was a disastrous one to the Bluebirds of this section. My deductions suggest that probably fifty per cent of all our Bluebirds were killed by the ice-storm. Recently I received a letter from Mr. George Lynn of Lockport, Illinois, who similarly has a series of thirty-five Bluebird boxes. He tells me that in 1935-36 he had 60 per cent of his boxes occupied. In 1937-38-39 he had about 50 per cent occupancy. This decrease he felt was due to an invasion of Sparrow Hawks. The spring of 1940 found but one box occupied. This fearful decrease in the number of pairs that normally nested in his boxes undoubtedly reflects the general reduction in birds due to the spring's ice-storm. The severity of the tragedy cannot be figured for another year, when my statistics will give a better idea of the true nature of the catastrophe.—T. E. MUSSELMAN, Quincy, Illinois.

Brewster's Warbler in Maryland.—The first-known record of Brewster's Warbler (*Vermivora leucobronchialis*) in Maryland is a specimen collected by A. H. Thayer at Beltsville on May 1, 1895, as reported by Richmond (Auk, 12: 307, 1895). It was described as "a typical male." On May 7, 1940, I collected, so far as I am aware, the second-known specimen of this hybrid from the State. It was found with other warblers near a small stream in a damp section of a young woods in the Loch Raven area of Baltimore County. This specimen is also a typical male. The under parts are pure white, upper parts grayish; the crown and a broad band on the wing-coverts are yellow. The lores and a thin stripe through the eye are black, bordered above by a white superciliary stripe that joins on the forehead. There is no indication of any yellow or green in the rest of the plumage. The specimen is deposited in the Natural History Society of Maryland.—HENRI C. SEIBERT, *The Natural History Society of Maryland, Baltimore, Maryland.*

Mourning Warbler breeding in central Massachusetts.—In northwestern Massachusetts, *Oporornis philadelphia* has long been known to breed at elevations of 1600 feet upward—and not solely in Berkshire County, as stated by Forbush in his 'Birds of Massachusetts and Other New England States' (3: 293, 1929), but also in western Franklin County where his friend, John A. Farley, found it as long ago as 1918 and 1920, and where, in the valley of the Deerfield River, at as low an elevation as 960 feet, a male was observed singing 'territorially' on July 7, 1938 (Eliot). But this occupied corner of the State is small—some 25 miles from east to west and 15 miles from north to south—and outside it, the species is accounted a scarce transient. In 1940, however, it bred in the town of Princeton, Worcester County, at least 50 miles farther east than any previous Massachusetts record, 18 miles south of the New Hampshire line, and at only 940 feet above sea-level. The location was 'Four Winds Farm', the summer home of the family of Douglas L. Kraus, who made the crucial observations with the assistance of James Peabody, a younger summer resident at Princeton. Many of the farm's tall white pines had been felled by the hurricane of 1938, and somewhere in the second-year growth of raspberry-canecanes, etc., among the fallen trees, the warblers, quite characteristically, nested. The nest itself was never (again characteristically) found, but on

June 28 both parents were seen with bills full of food for young presumably not yet a-wing; on July 14 the male's flight song was observed and next day he was watched feeding two full-fledged young; and on July 24 the female was seen with one juvenile. Mr. Kraus is a teacher in the chemistry department of Rhode Island State College, and a bird student of eight years' experience in many parts of North America. His identification of the species on these four dates is unquestionable.—SAMUEL A. ELIOT, JR., *Smith College, Northampton, Massachusetts.*

Baltimore Oriole in Tompkins County, New York, in winter.—On October 28, 1933, the late Victor Gould brought to me for preparation an immature male Baltimore Oriole, *Icterus galbula*, that he had collected that day near Ithaca, Tompkins County, New York. Gould informed me that he had seen one or two other "young-looking" Baltimore Orioles with his bird, so I am of the opinion that the little company were a late brood starting a much-delayed autumnal migration. The specimen was in good condition internally and externally. It weighed 42 grams.

On January 19, 1941, Mr. and Mrs. A. R. Vosbury found a female Baltimore Oriole dead in the snow near the door of their garage at 119 Ferris Place, Ithaca. This bird was in excellent feather so could hardly have escaped from a cage; but it was very thin, weighing but 25.3 grams. Mr. and Mrs. Vosbury said they had seen the bird alive about their feeding station one or two days previously.

Both specimens are now in the Louis Agassiz Fuertes Memorial Bird Collection at Cornell University.—GEORGE MIKSCH SUTTON, *Cornell University, Ithaca, New York.*

A new series of *Habia rubica rosea*.—In a recent collection, made by Chester C. Lamb at Sauta, Nayarit, two adult males and four birds in full female costume, one of them marked "male", have been found. These birds were secured apparently only about fifty miles north of the type locality, at Arroyo de Juan Sanchez on the coast of Jalisco, which was given in the original description by Nelson (Proc. Biol. Soc. Washington, 12: 60, 1898) as "fifty miles north of Ixtapa, Jalisco." Hellmayr (Birds of the Americas, pt. 9: 309, 1936) seems to be in error in recording this type specimen as having been taken in "Jalisco." A letter from Major E. A. Goldman confirms that his "Juan Sanchez" is in the State of Nayarit as at present known and is shown on Rand McNally's map as approximately thirty miles south of the capital city of Tepic. Mr. Lamb took his specimens south of it, but about fifty miles north of the type locality. I cannot seem to find any record of *rosea* having been obtained since the securing of the type series. It is for this reason that it seems worth while to record these specimens.

Although I have not seen the type, these Sauta birds are exactly like the description given by Nelson in his original paper and by Ridgway (Birds of North and Middle America, pt. 2: 147, 1902) and have been compared with the series of more than fifty specimens belonging to the various races of *Habia rubica*, all in the Moore collection. *H. r. rosea* is a very well-marked form.—ROBERT T. MOORE, *Pasadena, California* (Contribution from the California Institute of Technology).

Second flight of the Sitka Crossbill to Massachusetts.—In my monograph of the crossbills (Proc. Boston Soc. Nat. Hist., 41: 94, 95, 123-124, Jan. 1937) I sought to show that a great flight of the small, stubby-billed crossbill from the Alaskan coast crossed the continent and occurred in some numbers in the Atlantic seaboard States during the winter of 1887-88, and that vagrants were collected in 1900 and 1914.

1. On March 9, 1941, Mr. Nathaniel C. Nash IV found four Red Crossbills on his own lawn in Cambridge and kindly telephoned me. I went over at once and was convinced that they were in all probability Sitka Crossbills (*Loxia curvirostra sithensis*). Then next morning, Chief of Police Timothy F. Leahy kindly gave me special permission to collect one, as did also the owners of all the local property possessing cone-bearing trees. The members of the Harvard Ornithological Club were especially helpful in patrolling the area and reporting to me when the crossbills made an appearance. On March 18, after several visits, a favorable opportunity occurred and a xanthochroistic adult male having a wing length of only 80.5 millimeters was collected. The flock steadily increased in numbers to a maximum of twenty-eight birds and they lingered till the last day of April, so Mr. Nash tells me. All observers including myself noticed the high percentage of 'orange' males, and I am convinced that every bird in this flock was of the same subspecies. They were frequently approached to within twenty-five feet.

2. On Tuesday, March 11, Professor L. F. Fieser, of Harvard University, most kindly brought me a very small adult male Sitka Crossbill, found dead on his place at Belmont on the 9th. A flock of seven appeared occasionally in that section of Belmont for several days.

3. On April 8, Mr. Francis H. Allen kindly took me to a certain 'pinery' in Dedham, where he had found about forty crossbills. We found some of these birds perching in some high pines, the males in song. There appeared to us to be two sizes, but the distance was considerable. These birds finally descended to some low Scotch pines to feed, and about eight birds were studied at very close range. None was collected as I did not feel sure that any were small enough to be Sitka Crossbills. The flock dashed off and disappeared, and Mr. Allen left. I remained another two hours. First a group of four birds returned which appeared to me to be Eastern Crossbills. Then a flock of twenty-six came flying in. These were studied at leisure, at very close range indeed on two occasions. All seemed to me to be Sitka Crossbills; about half the males were 'orange,' and I finally collected one that proved to be a typical *sithensis*. Out of a total of thirty-seven birds, twenty-six were positively *sithensis*, one was an adult male White-winged Crossbill, and ten were probably or possibly the eastern subspecies.

4. On Monday, April 7, Mr. Charles E. Clarke of the Nuttall Ornithological Club, found a flock of Red Crossbills at the Fay Estate in Lynn. Mr. S. Gilbert Emilio visited this locality on Wednesday, finding fifteen birds, of which fourteen were small with stubby bills, and one was obviously larger, with a bigger and heavier bill. One typical *sithensis* was collected for the Peabody Museum at Salem. I visited this place on the 12th with Messrs. Bergstrom and Morgan of the Harvard Ornithological Club. Ten crossbills were found in some small pines, and studied at very close range. The larger bird was present and separable from the nine others to the naked eye, and I am positive that it was an Eastern Crossbill. These birds lingered into May.

5. On January 19, Messrs. Wendell Taber and Richard Stackpole discovered some Red Crossbills in a tract of hemlock woods at Prides Crossing, Essex County, where White-winged Crossbills were common and Pine Siskins abundant. Various observers including myself saw these birds on several occasions. They were obviously larger, with heavier bills, than the White-winged Crossbills and I am positive that they were not Sitka Crossbills. They disappeared long before the March flight began.

6. Various people have reported Red Crossbills to me at feeding stations in various suburbs south and west of Boston since the middle of March. They were able to be sure of the species only. Mrs. Dane of Lexington, however, had three birds on her window feeding-shelf with Purple Finches and was struck by their small size in comparison and their stubby bills. She really does know the Eastern Crossbill, and there is a good probability that her birds were Sitka Crossbills, as she suspected at the time.

7. On March 31, so Professor S. A. Eliot, Jr., advises me, a flock of crossbills appeared in the larches in Childs Park, Northampton. The extreme tameness of these birds permitted very close studies, and on at least one occasion White-winged Crossbills were present for direct comparison. Professor Eliot was convinced that they were Sitka Crossbills. He took eight of us there on April 20; we were within twenty-five feet of these twenty birds, and I am positive every one was a Sitka Crossbill. A few minutes later we were taken to a lawn on the main street of Northampton. Here, feeding on the ground under a hemlock tree, fifteen feet only from a sidewalk with Sunday crowds passing to and fro, were ten White-winged Crossbills and fifteen Red Crossbills. The majority of these were as small as, or even smaller than the White-wings, with stumpier bills. It is just possible that three birds were a little bigger, but certainly the difference was not sufficient to make sure of two different subspecies, as in the case of the odd bird at Lynn. I might add that six out of the eight visitors from eastern Massachusetts had had recent experience with the birds where collected specimens had positively proved identity. No matter how desirable, it was of course out of the question to shoot a specimen at either place. I can do no more than give my opinion and the evidence back of it, but I think Professor Eliot is to be complimented on his diagnosis of these birds.

8. I have heard of flocks of Red Crossbills at two places on Long Island, New York, and Mr. Charles P. Preston just writes me of eleven Red Crossbills on April 12 at Westmoreland State Park, forty miles east of Fredericksburg, Virginia. It is to be hoped that specimens can be collected.

9. The evidence is that a very few Eastern Crossbills are present, and the assumption that all birds seen are the Alaskan race is unfortunately not justified.

10. For the benefit of readers in the eastern States, whose reference books do not mention the Sitka Crossbill, the following points may prove useful under the most exceptionally favorable circumstances. As many observers are aware, the White-winged Crossbill is a smaller bird than the Eastern Red Crossbill, with a smaller and slenderer bill, and these differences are obvious in life when the two species are together at close range. The Sitka Crossbill, as regards extreme or typical specimens, is just as small as a small White-winged Crossbill; the bill is equally slender, but not so long, giving a stumpy effect.—LUDLOW GRISCOM, *Museum of Comparative Zoology, Cambridge, Massachusetts.*

Early records of the Clay-colored Sparrow in Michigan.—Except for A. B. Covert's unsupported statement in 1881 (*Hist. of Washtenaw County*, p. 181) that the Clay-colored Sparrow (*Spizella pallida*) is "a very rare migrant" in Washtenaw County, the first Michigan record which we find in the literature is in Amos W. Butler's 'Birds of Indiana' (1898: 960). Butler said, "Mr. L. Whitney Watkins took several specimens from about forty seen at Manchester, Mich., September 3, 1894." A few years ago William G. Fargo presented the Watkins collection to the University of Michigan and we are therefore able to check these original specimens.

They still bear Watkins's original label with the words "Clay-colored Sparrow" in his handwriting, but as we suspected, they prove to be Chipping Sparrows (*S. passerina*). There are two such specimens taken September 3, one September 4, and two September 9, 1894. In addition there are four similar specimens taken in 1895 (October 3 to 14) and also mis-labeled "Clay-colored Sparrow." We must therefore discard entirely this early report based on Watkins's mis-identified specimens. Unfortunately this erroneous record has already been quoted in the literature at least twice: by R. Ridgway (Bull. U. S. Nat. Mus., no. 50, pt. 1: 325, 1901) and by W. W. Cooke (Bird-lore, 11: 260, 1909).

We then pass to 1901 for our first authentic Michigan record. On May 2 of that year P. A. Taverner shot a male at Port Huron (Auk, 22: 89, 1905). Taverner recorded the specimen as being "in the collection of J. H. Fleming of Toronto" and W. B. Barrows later repeated this statement ('Michigan Bird Life,' 1912: 510). However, as I now learn from Mr. Taverner, Fleming later returned the specimen to Bradshaw Swales in Michigan. It came to the University of Michigan with the Swales collection in 1913 and is now no. 43500 in the Museum of Zoology collection.

The second Michigan record specimen is the male collected by W. A. Maclean of the University of Michigan expedition at Washington Harbor, Isle Royale, on August 25, 1904. Several others were seen there during the following days (Rept. Michigan Geol. Surv. for 1905, 1906: 125).

The third Michigan specimen is a male collected by N. A. Wood for the University of Michigan at Whitefish Point, Chippewa County, on May 22, 1914 (Sixteenth Rept. Michigan Acad. Sci., 1914: 68).

There seem to be no other records until 1924 when Joseph Kittredge, Jr. (Auk, 42: 144, 1925) made the interesting discovery that the Clay-colored Sparrow was apparently breeding at a number of points in both the Lower and the Upper Peninsulas. Two years later he published additional records for Menominee County (Auk, 44: 259, 1927). Following this lead, others began to find the species at many localities and we now have records for at least sixteen counties in the Lower and eleven in the Upper Peninsula. In many of these places the Clay-colored Sparrow is fairly common. Since the habitat in which the species is usually found in Michigan represents only one stage in the ecological succession which follows lumbering and burning of those regions, it seems reasonable to conclude that the Clay-colored Sparrow was not merely overlooked but was at least rare and has now actually become much more common and widespread in Michigan than it formerly was or probably will be after a few more years have passed.—
JOSSELYN VAN TYNE, *University of Michigan, Museum of Zoology, Ann Arbor, Michigan.*

'Anting' by the Cardinal.—An instance of 'anting' by the Cardinal (*Richmondia cardinalis*) recently was brought to my attention and in view of the fact that this habit apparently has been seldom observed among fringilline birds the details are here reported.

On the afternoon of September 16, 1940, Mrs. T. B. Kurata observed three Cardinals, a male, female and juvenile, behaving in a peculiar manner at her feeding station in the High Park district of Toronto. She first noticed that they were picking up minute objects which were wiped through the body feathers,—under the wing, about the thighs and at the base of the tail. Closer inspection revealed that these objects were small, winged, 'red' ants, hosts of which were emerging from the ground. The birds seemed somewhat excited and persisted at this occupation for ap-

proximately two and one-half hours. At the end of this time their body feathers appeared wet as if the birds had been bathing. It is obvious that the insects had been crushed.

In the evening Mr. Kurata searched the ground in the restricted area where the birds had been but could not discover any of the ants, dead or alive. It is possible that the Cardinals had eaten the insects after applying their juices to their plumage.—L. L. SNYDER, *Royal Ontario Museum of Zoology, Toronto.*

Observations on 'anting' by birds.—For a number of years I have kept native songbirds in captivity and semi-captivity. The use of the word 'semi-captivity' in relation to songbirds seems to be little understood by bird students or at least it seems unfamiliar or far-fetched. By semi-captivity I mean that any pair of birds which nest in the aviary are given day-time liberty during the period of egg laying and incubation and full-time liberty—unless predators are known to be nesting within hunting distance—during the time of rearing the young and until they are weaned or ready for weaning. When eggs are being laid and incubation is taking place the birds are allowed out early in the morning and closed in the aviary before dusk. After the breeding season is over they are kept in the aviary or the bird-room until the next nesting season. The only exception has been with Blue and Blue-fronted Jays which were given their liberty again during the day, from the first of December to the first of March. These birds were called to the aviary before dusk and closed in for the night. At no time have I ever seen any of these birds 'anting' while at liberty. Nor have I seen them going through this peculiar performance in the aviary except when a shovelful of earth from an anthill was put in. As I hope to be able to make a much closer study of 'anting' during the summer of 1941 I will not at present go into much detail regarding my observations. At that time I wish, if possible, to confirm certain presumptions besides, so will largely confine myself at present to a few general remarks and a list of birds I have seen performing.

One point I would like to bring up at present is in connection with the theory advanced by some that ants may be used either to destroy parasites on the body or to prevent the entrance into the feathers of such parasites, having in view the possibility that formic acid exuded from the ant may act as a preventative. I will not express an opinion on this, but in view of the following I think it deserves considerable thought and study.

We are aware that birds may reach easily most parts of the body with the bill. Yet so far as my observations go they do not attempt to rub the ant on or among the feathers of those parts of the body most apt to be infested with parasites, such as under the wings, around the vent, or on the rump and head. Invariably the ant seems to be rubbed along the edge and under side of the outer primaries and on the tail only. The wings are spread and held spread to some extent during the performance and the greatest effort seems to be made to rub the ant on the under side of the tail. This effort, which should be so easy, is the cause of the comical contortions always prominent. They try continually to bring the tail under them to such an extent that they often tumble on their back while so doing and many times I have seen them actually sitting on their tail.

Whether or not the ants are eaten I am not sure, although I think they are. I have examined the ground after the performance is over and failed to see either live or dead ants, so that the presumption would be that they were eaten. As a great many of my birds are hand-reared and exceedingly tame—so much so

that I may sit among them while they are going through their strange antics—it should not be difficult during another season to substantiate my presumption, or otherwise. Certainly an ant is held in the bill for only a short time and another is taken in its place. The whole procedure seems to be so exciting to the birds and so intense that even enmity is forgotten. I have seen as many as twenty or more birds of a number of species, going through the performance on a space of only about six square feet. Not only is it a most comical sight which will nearly bring tears of laughter to the eyes, but a most beautiful sight, as such birds as those which are highly colored under the wings like the Rose-breasted Grosbeaks show these generally hidden colors to great advantage.

Although all the ground thrushes which I have had, perform, I have not seen the Bluebird (*Sialia sialis*) do so. They, so far, have been interested only in the ants or larvae as food. I keep very few exotics, therefore have not been in a position to determine whether or not they too 'ant,' with the exception of the Pekin Robin whose actions are the same as those of our songbirds.

The only birds which I have seen use any other material than ants are the Bronzed Grackles. They went through the identical performance with choke-cherries. Curiously enough, although I feed large quantities of this fruit in season, none of the other birds has used them for this purpose so far as I know.

In a review of this subject, W. L. McAtee (Auk, 55: 98-105, 1938) lists sixteen species and six passerine families in which this behavior has been noted. M. M. Nice and J. ter Pelkwyk in "Anting' by the Song Sparrow" (Auk, 57: 520-522, 1940) add one species and one family. I am able to report this behavior in three more families and sixteen additional species. New records are indicated by asterisks.

The following is a list of the birds I have seen 'anting' in the aviaries:

CORVIDAE: Blue Jay (*Cyanocitta cristata*)

*MIMIDAE: *Catbird (*Dumetella carolinensis*)

TURDIDAE: *Robin (*Turdus migratorius*), *Wood Thrush (*Hylocichla mustelina*),

*Hermit Thrush (*Hylocichla guttata*), *Veery (*Hylocichla fuscescens*)

*BOMBYCILLIDAE: *Cedar Waxwing (*Bombycilla cedrorum*)

TIMELIIDAE: Pekin Robin (*Leiothrix lutea*)

*ICTERIDAE: *Baltimore Oriole (*Icterus galbula*); *Bronzed Grackle (*Quiscalus quiscula aeneus*) (choke-cherries only)

FRINGILLIDAE: *Cardinal (*Richmondia cardinalis*), *Rose-breasted Grosbeak (*Hedymeles ludovicianus*), *Indigo Bunting (*Passerina cyanea*), *Evening Grosbeak (*Hesperiphona vespertina*), *Fox Sparrow (*Passerella iliaca*), *Slate-colored Junco (*Junco hyemalis*), *Harris's Sparrow (*Zonotrichia querula*), *White-throated Sparrow (*Zonotrichia albicollis*), Song Sparrow (*Melospiza melodia*).—H. R. IVOR, Erin-dale, Ontario.

Observations at Guaymas, Sonora, Mexico.—The brief period from April 12 to 16, 1940, was spent by the writer at Miramar Beach, near Guaymas, Sonora, Mexico. It was purely a vacation trip and only superficial notes on the bird life were kept. However, it appears that Sonora records are so comparatively limited that the following observations may be worthy of publication. No specimens were taken and subspecific designations are assumed.

Ornithological highlight of the visit was a three-hour boat trip from Miramar Beach to Guaymas and return in the late afternoon of April 14. Every member of the party was greatly impressed with the untold numbers of waterbirds which the rich waters of the Gulf of California support. It was literally "a parade of the sea

birds." Platoons of California Brown Pelicans (*Pelecanus occidentalis californicus*), in perfect formation, aggregating thousands of individuals, skimmed close to the boat in both directions. Amusing were the seeming efforts of occasional cormorants, which had aligned themselves with the pelicans, to keep time with the alternate sailing and flapping of their larger companions. Both Farallon Cormorants (*Phalacrocorax auritus albociliatus*) and Brandt's Cormorants (*Phalacrocorax penicillatus*) were observed, sometimes in such numbers that the sound of their beating wings was very noticeable.

The gull family was represented by the Yellow-footed Gull (*Larus occidentalis livens*), whose yellow legs were plainly visible to the naked eye, Heermann's Gull (*Larus heermanni*), which nests on many islands in the Gulf, and Bonaparte's Gull (*Larus philadelphia*), which, though far from its nesting grounds, was the most abundant gull seen. Great flocks of them contained individuals in all stages of plumage, from the winter phase to the full black head of the breeding season. We also saw pearly-backed gulls that were either California Gulls (*Larus californicus*) or Ring-billed Gulls (*Larus delawarensis*)—or both, but our notes make no mention of terns.

This boat ride marked the writer's first acquaintance with the Man-o'-war-bird (*Fregata magnificens rothschildi*), whose graceful silhouette against the sky was much admired. Its ease and skill in flight were marvelous, even though used for robbing other birds of their catch. Parasitic Jaegers (*Stercorarius parasiticus*) were seen engaged in the same banditry. We scanned the islands that we passed for possible Man-o'-war-birds' nests, not then knowing that the nearest-known breeding ground of this bird is some 250 miles distant, at Santa Margarita Island on the Pacific coast of Lower California. The only species that we saw actually sitting on its nest was the Treganza's Blue Heron (*Ardea herodias treganzai*), which here builds its bulky home of sticks on the precipitous cliffs of the offshore islands. Hundreds of boobies of two kinds, Brewster's Booby (*Sula brewsteri*) and Blue-footed Booby (*Sula nebouxi*), were also to be seen on the ledges of the islands, but we could not actually detect any eggs through our 8-power binoculars, though it was the proper season. Our boatmen informed us that on San Pedro Nolasco Island, visible about 25 miles away, many seabirds nested, but that the whitewashed cliffs we were passing were used chiefly as roosts. The long lines of boobies in flight, like those of the pelicans, provided perfect examples of bird formation. When fishing, both pelicans and boobies plunge headlong from a height, a truly inspiring sight when scores are thus engaged simultaneously.

The commonest duck was the Lesser Scaup (*Nyroca affinis*); large flocks were seen in the quiet bays at the base of the towering cliffs, where, with both cliff and duck reflected in the smooth water, they gave almost the appearance of floating in mid-air. In Bocochibampo Bay, which was the starting and ending point of the trip, was a large and closely massed flock of Red-breasted Mergansers (*Mergus serrator*). The waterbird list is completed by the Pacific Loon (*Gavia arctica pacifica*), a few swimming individuals of which were seen—at least they were believed to be of this species.

Two landbirds were observed on the boat ride, Turkey Vultures (*Cathartes aura septentrionalis*) and Audubon's Caracaras (*Polyborus cheriway auduboni*), both of which were seeking or eating the fish heads and other offal discarded on the beaches at the entrance to Guaymas Harbor. Near the fish and oyster plants in the city of Guaymas we saw, on other occasions, a number of Black Vultures (*Coragyps atratus atratus*); and this is the only place where we saw them.

Our notes on landbirds seen in the vicinity of Guaymas reveal nothing worthy of record, unless mention be made of the Sonoran Parrots (*Amazona albifrons saltuensis*) which we found in the 'cactus forest' between San José de Guaymas and Empalmé. Here, in a close stand of giant cactus, which was about the last place where we should ordinarily have looked for parrots, we encountered several of these noisy, handsome birds. Our attention was divided between them and a pair of solicitous Harris's Hawks (*Parabuteo unicinctus harrisi*), which either were nesting, or about to nest, in the cactus grove.

These rambling remarks may close with the mention of a Dickey's Egret (*Di-chromanassa rufescens dickeyi*) observed from the bridge which connects Empalmé with Guaymas, and of a Frazar's Oyster-catcher (*Haematopus palliatus frazari*) seen in the estuary behind Miramar Beach. There it shared the company of several Brewster's Egrets (*Egretta thula brewsteri*) throughout our stay.—CLINTON G. ABBOTT, *San Diego Society of Natural History, San Diego, California.*

FIFTY-NINTH STATED MEETING OF THE A. O. U.

THE Fifty-ninth Stated Meeting of the Union will be held in Denver, Colorado, on September 1-4, 1941, followed by two field trips: to the top of Mt. Evans (14,000 feet) on Friday; and on the prairies all day Saturday. There is a good road to the top of Mt. Evans, which is the highest place in the United States that one can reach by automobile.

Headquarters will be at the Cosmopolitan Hotel, Broadway and 18th St., Denver, where the annual banquet will be held on Wednesday night, September 3. All meetings will be held in the new Phipps Auditorium of the Colorado Museum, beginning Tuesday morning, September 2. The Local Committee is: Dr. Alfred M. Bailey, *Chairman*, Fred G. Brandenburg, E. R. Kalmbach, R. J. Niedrach, and C. C. Sperry, to whom further inquiries may be addressed.

RECENT LITERATURE

Stonor's 'Courtship and Display among Birds'¹ brings together from many sources a series of 58 magnificent photographs showing some of the most beautiful and spectacular displays of birds, including those of the Bustard, Frigate-bird, Bird-of-Paradise, grouse, heron, albatross, grebe, wagtail, penguin, Ruff, Lyre-bird and Kagu; the text describes these displays and touches on their uses. Courtship is said to be "of profound importance as an 'awakener' prompting the bird to begin its breeding activities, keeping it keyed up when once it has started." The displaying male stimulates himself as well as the female. It is suggested that visual stimulation acting through the pituitary gland effects this, and is compared to the effect of a work of art on a man, or an incomplete clutch of eggs stimulating a female to continue laying. However, it is also admitted that the attracting of a mate is often most important. Mutual display, continued after pairing, helps to keep the birds "up to the mark" in their nesting duties. Communal display increases advertisement value, and provides greater stimulation for each bird; lack of this might be a factor in the sudden extermination of a bird reduced in numbers. Display grounds increase the effect of displays. The possible social and recreational use of some of these is mentioned, still a rather problematic question. The comparative studies of some displays and the structures used in them are an interesting feature. The displays and adornments of a closely related group of Birds-of-Paradise can be arranged in a series of increasing complexity, illustrating their possible phylogeny; in this group evolution of display has kept pace with evolution of adornment. In gamebirds the displays show less variation; in this group the evolution of display has not kept pace with the evolution of adornment. Stonor concludes that in some cases evolution of form preceded that of display.

Many other generalizations are scattered through the book, but the discussion is not well rounded. Birds tend to breed when conditions are most favorable and environmental factors, notably light, appear to control this. Once started, display may have an additional effect, but probably it is more important in this phase in bringing the pair together and aiding physical contact. Some generalizations are too sweeping, as that all brilliant colors have a use, as those of fruit pigeons for protection; and that "the greatest thing a bird is up against . . . is that it must . . . blend and tone in with its surroundings." Some examples, such as the following, were better omitted: the account of five manakins sitting in a circle, one keeping somewhat apart and piping a short song while the rest hopped up and down in rhythm; Hudson's Cayenne Lapwings, in which mated pairs welcome with pleasure strangers that visit for purposes of amusement or play; and the hummingbird, *Loddigesia mirabilis*, that brings over its head the spatulate tips of two elongated tail-feathers and claps them together with a cracking noise. The data on Birds-of-Paradise in the wild contain some inaccuracies: it is doubtful if any species was ever in immediate danger of extermination; they do not all live in rain forest; the sexes do not live at different levels in the forest during the non-breeding season. This book is meant to acquaint the general public with some of the most beautiful and spectacular phenomena of bird life and both text and photographs serve their purpose well. There is a brief foreword by Dr. P. R. Lowe.—A. L. RAND.

¹ Stonor, C. R. Courtship and / Display among Birds. 8vo, xv + 139 pp., pls. 1-57, text figs. 1, 2, 1940; Country Life Ltd., London. Price 8 shillings 6 pence.

Chance's 'The Truth about the Cuckoo.'—In his second book,¹ Mr. Chance again tells the truth about certain aspects of the life history of the European Cuckoo (*Cuculus canorus*). The reviewer was not aware that the author's previous book, 'The Cuckoo's Secret' had failed to convince bird students that the cuckoo (1) lays the egg directly into the fosterer's nest and (2) deposits the eggs on alternate days. These points are adequately proved in the detailed series of experiments recounted in the body of the book. The author manipulated the nests of the hosts so that the cuckoo would have nests available for cuckolding. A series of excellent motion-pictures shows the details of oviposition. The principal host, the Meadow Pipit, and several less important hosts are treated in the descriptive chapters.

The interpretive chapters deal briefly with several subjects. The theory that the cuckoo lays the egg on the ground and then places it with the beak or from the gullet into the nest of the host is refuted. The adherence of a particular cuckoo to a certain species of fosterer is again affirmed. Admittedly basing his opinion on insufficient evidence, the author concludes that cuckoos are monogamous and pair for life. The theory that each female maintains a territory, at least in respect to one species of host, seems well founded. A description of the young cuckoo, call notes and the variation in egg markings comprises three chapters. It must be remembered that these studies are based on the extremely probable assumption that the identity of a cuckoo can be determined by the markings on the eggs. This assumption should be definitely proved. The book contains much valuable data on the host species and a chapter by R. C. Punnett on the genetical aspects of the cuckoo's life history.

The author obviously did not intend this book to be a monograph of the life history of the cuckoo. Accordingly there is no correlation of the literature. However, the experiments of Jenner in 1787 on the method by which the young cuckoo ejects the rightful occupants are quoted extensively. It is hoped that Mr. Chance will write another book making available his knowledge of the life history of this interesting bird. The complete truth would include such essential points as the incubation period, survival and development of the young, activities of the male, and a correlation with the voluminous literature on the various species of cuckoos. Banding experiments could prove the assumption that a cuckoo lays in the nests of that species by which she herself was raised. The author should avoid the lapses into the anthropomorphic and mystical viewpoints.—D. E. DAVIS.

'The New Systematics.'—While not properly a bird book, this volume² is still of such provocative and outstanding interest in the field of the natural sciences that it is perhaps not amiss to call attention to it here. The English have always been leaders in the field of evolutionary study. This book, sponsored, so Professor Huxley tells us in the Foreword, by the Association for the Study of Systematics in Relation to General Biology, is an interesting attempt to present the problems lying before those workers concerned with the field of evolution. To the museum taxonomist as well as to the field naturalist the question of the relationship of species whether it be through morphological characters or behavior is an all-important one. To the laboratory worker on the other hand the importance of species is in general only beginning to become apparent. Shortly after the publication of 'The Origin of Species' as someone has aptly remarked, "biology went into a

¹ Chance, Edgar P. *The Truth / about the Cuckoo* / 8vo, xvi + 207 pp., illustr., 1940; Charles Scribner's Sons, New York and London. Price \$4.00.

² *The New Systematics*. Edited by Julian Huxley. 8vo, viii + 583 pp., 1940; Oxford, at the Clarendon Press. \$6.00.

room and shut the door." Through the field of ecology it is only now beginning to poke its head outside again. This book then is a sincere and well-planned attempt to point out wherein the studies of the taxonomist, the ecologist, and the experimentalist are related, what their problems are, and how each should play a part in 'The New Systematics.'

Besides Huxley's Introduction, there is a total of twenty-one chapters by various specialists including de Beer on 'Embryology and Taxonomy,' Launcelot Hogben on 'Problems of the Origins of Species,' Calman on 'A Museum Zoologist's View of Taxonomy,' Diver on 'The Problem of closely related Species living in the same Area,' and Timofeeff-Ressovsky on 'Mutations and Geographical Variation.' There are several chapters primarily on genetic work by Sewall Wright, C. D. Darlington, and H. J. Muller as well as other sections on paleontology, plant taxonomy, and ecology with a good many examples taken from the field of birds. Some of the points brought out in regard to taxonomy are particularly interesting. Thorpe in his chapter, 'Ecology and the Future of Systematics,' suggests that "just as the experimental biologist has adopted the most advanced technique of physics, chemistry, and mathematics to advance his investigations, so the taxonomist must be prepared to adopt any and every line of attack in the study of the species-problem. The fact that taxonomic work in the past has in many cases been so strongly vindicated by subsequent biological investigation, while it reflects the greatest credit on the ability—or rather genius—of the best taxonomists, does not absolve him from adopting new methods. But to enable this development to take place the museum of the future, great though recent improvements have been, will have to be a very different place from that of the present day." Both Thorpe and Huxley point out the improvements which they envisage for museums, namely experimental departments, greater facilities for field studies, embryological studies, and finally, the need for greater amounts of statistical data taking advantage of the new developments in biometry.

But it is difficult to indicate in more than a very general way the scope of this book. Perhaps one of the most interesting aspects of it is that it attempts to be a prophetic book. It attempts to correlate the recent advances in various fields and to point out the ways in which further advances may be charted. Such a study is always fascinating and particularly so to the Ornithologist of today who must be aware that the days of purely descriptive taxonomy are numbered. But as Thorpe remarks, if taxonomy "is properly related with methods of experimental biology and ecology, there is no work of greater interest and importance." Lastly, it is not without significance that Professor Huxley, ever in the van of the trends in biology, should engage with such a notable company in this exhaustive consideration of the species-problem. It is difficult to avoid the conclusion that 'The New Systematics' represents a valuable and important addition to the literature on evolution.—S. D. RIPLEY.

Dr. Gabrielson's 'Wildlife Conservation' is a timely book,¹ written by a high authority, for the purpose of bringing more clearly before an awakening public some of the basic facts and principles underlying the perpetuation and legitimate use of our wildlife resources. The unthinking destruction and exploitation of pioneer days must give place to a wise planning for the future, yet in order to do even this much, more practical knowledge is needed of the varied requirements

¹ Gabrielson, Ira N. *Wildlife Conservation*. 8vo, xv + 250 pp., illustr., 1940; The Macmillan Co., New York City. Price \$3.50.

and complex interactions of the many elements that go to make up our fauna and flora.

The first half of the book is chiefly concerned with the factors of environment,—soil, water, forests, grassland; the latter half considers especially fish, furbearers, and large and small game animals, in their relation to man, to one another, and to their surroundings. Thus it is shown how the predatory mammals may be an important factor in regulating the numbers of a non-predatory species to the carrying capacity of its range (as the Kaibab deer); again, we cannot expect a species to maintain its numbers if we destroy its needed environmental conditions of food and shelter. Restoration of the environment may therefore be a crucial factor in preservation of the species. Conservation means far more than mere protection; it implies the maintenance of a harmonious balance between reproduction, the carrying capacity of the available range, the use and perpetuation of the species.

The chief difficulties in the way of proper conservation policies, the author sums up as three: (1) the shortsightedness of the human race; (2) the tendency to seek panaceas rather than real remedies; and (3) the lack of knowledge and understanding. We are beginning to lay up a store of knowledge; let us hope that it may increase fast enough to overcome the first and second of these obstacles!

The book is well written, in clear straightforward style, is well illustrated and makes interesting reading, while at the same time driving home the various points with incontrovertible facts and treating various aspects with the utmost fairmindedness and breadth of vision. The volume might well form a supplementary text in a college course on conservation or supply much-needed information for the general public on the urgent necessity for a farsighted program of reconstruction.—G. M. ALLEN.

Mrs. Cruickshank's *'Bird Islands Down East'* is a narrative of the author's adventures on various expeditions with her husband to the seabird colonies on the rocky coast of eastern Maine. Many of the outer islands are uninhabited and support flourishing populations of terns, puffins, cormorants, Leach's Petrels, Herring and Laughing Gulls; on other lonely islets a lighthouse keeper or a lobsterman or two carry on their duties in the midst of the abundant bird life and welcome an occasional visitor. Ably and devotedly seconding her husband's work, the author recounts some of their difficulties and successes in reaching these outposts, banding, photographing and observing birds with a zest that is contagious. While there is much incidental information on the habits of the birds, no attempt is made to give detailed life histories or to present the results of the hours spent in blinds making observations. Nevertheless, the book¹ forms an interesting contemporary record of these bird colonies, now so populous where fifty years ago they had become reduced to precarious numbers.

The many illustrations are from well-chosen photographs secured on these expeditions, and form thirty plates. Some of them, such as those of an Osprey passing overhead, the close-ups of terns, phalaropes and cormorants, are of unusual merit. The volume itself is not too large nor too long for convenient companionship, and is a distinguished addition to the various popular bird books brought out by the publishers in recent years.—G. M. ALLEN.

¹ Cruickshank, Helen Gere. *Bird Islands Down East*. With photographs by Allan D. Cruickshank. 8vo, xii + 123 pp., 30 pls., 1941; The Macmillan Co., New York. Price \$2.50.

Laboratory Ornithology.—The simultaneous appearance of new editions of ornithological outlines for students attests their usefulness in connection with teaching this subject. Professor Baerg's 'Elementary Ornithology' now appears in printed rather than mimeographed form, neatly bound in stiff paper covers. The pages are the size of a typewriter-sheet, printed on the right-hand side, leaving the opposite pages blank for notes. The table of contents indicates the broad scope of treatment, beginning with a page of general reference books, a short sketch of ornithological history, with a few paragraphs on American ornithologists and bird artists. There are paragraphs on extinct birds, reptilian and avian characters, a geological time-table, food, color, plumages, anatomy, song, habits, with special accounts of certain species, all designed to supply the student with suggestive information and source references in gaining an elementary knowledge of birds. While one might criticize the somewhat vague sequence of the subjects and the miscellaneous nature of some of the information, nevertheless it is evident that the purpose of the author is to stimulate interest rather than to provide too formidable an array of facts. Misprints are few (on page 8, read *Teratornis* and *Aepyornis*), the type is large and clear and the many references enable the independent student to pursue the subject farther. For regional use, a better list of State ornithologies, rather than the few given on the prefatory page, might prove worth adding.

Dr. Arthur A. Allen's 'Ornithology Laboratory Notebook' now reaches its fourth edition in much improved form, bound in stiff paper covers, and with much additional matter in the way of charts to be filled in, giving the student a more vivid impression of the characters, colors and habitats of North American birds; added are printed check-lists to be filled in on field excursions. A map in colors shows the life zones of North America. While prepared originally with reference to the birds to be met with in central New York, this new edition is so arranged as to be applicable over a much wider field and thus to have a more extensive use. With thirty years' experience in teaching ornithology at Cornell University, the author finds that an excellent method of approach is for the student to learn to name the bird from a study of its characters, and from the interest thus aroused, to lead him on to the more detailed aspects of the subject. These, however, are evidently left for a more advanced course.

Helpful and suggestive outlines for elementary study such as these,¹ should prove very useful to the teacher confronted with the problem of offering a course on ornithology, and emphasize on the one hand the approach through literature, on the other the approach through laboratory and field studies.—G. M. ALLEN.

Roberts on Wilson's Petrel and the breeding behavior of Penguins.—A pressing need of modern ornithology is the study of species living outside the temperate zones. We are now fortunate to have comprehensive recent studies of two Antarctic species, Wilson's Petrel and Gentoo Penguin. These two monographs² result

¹ Baerg, W. J. *Elementary Ornithology*. Large 8vo, revised ed., 68 pp., 1941; Russellville, Ark. Price \$1.50, from the author at Fayetteville, Ark.

Allen, Arthur A. *Ornithology Laboratory Notebook*. Large 8vo, fourth ed., 204 pp., with 32 additional pages of figures, colored map, and other figures, 1941; Comstock Publishing Co., Ithaca, N. Y. Price \$3.00.

² Roberts, Brian. 'The Life Cycle of Wilson's Petrel, *Oceanites oceanicus* (Kuhl).' *Sci. Repts. British Graham Land Exp.* 1934-37, 1 (no. 2): 141-194, Aug. 30, 1940; British Mus., London. Price seven shillings six pence.

Roberts, Brian. 'The Breeding Behaviour of Penguins with Special Reference to *Pygoscelis papua* (Forster).' *Sci. Repts. British Graham Land Exp.* 1934-37, 1 (no. 3): 195-254, Aug. 30, 1940; British Mus., London. Price five shillings.

from the British Graham Land Expedition of 1934-37. Dr. Roberts observed the birds during three seasons and at several localities in West Antarctica.

Wilson's Petrel (*Oceanites oceanicus*) breeds in at least a dozen localities surrounding the Antarctic continent. The author divides the species into four populations—*Oceanites oceanicus oceanicus*, *O. o. exasperatus*, *O. o. parvus*, and *O. o. magellanicus*, nom. nov.—differing only in the mean of their measurements as determined by an extensive study of specimens and review of the literature. A colony of twenty-three nests supplied the data on breeding habits. After observations were concluded, dissection of one member of each banded pair determined the sex. Banding experiments proved that the same birds return yearly to the same burrow and mate; thus the joint ownership of the burrow provides the 'bond' between the sexes. Courtship, consisting of elaborate mutual preening and billing, and copulation occur inside the burrow. The one egg laid is not replaced if taken. Males and females incubate in alternate periods of about 48 hours, changing places at night. The incubation period varied between 39 and 48 days in nine cases. The young grow rapidly for about two weeks and then fluctuate greatly in weight, due to irregular feeding as a result of snowfall. Since the chicks frequently weigh twice as much as the adults, they can withstand starvation for a week by using up the stored fat. The chick attains the homoiothermic condition in the short time of two days; the interior of the burrow is not below freezing. A series of monthly distribution maps describes the migration in the several oceans. A complete summary, list of references and ten photographs complete the paper. About the only criticism is the conclusion that since oil or fat will quickly attract petrels, they have a "strong sense of smell."

The second monograph reports studies on the breeding behavior of the Gentoo Penguin (*Pygoscelis papua*) and of other penguins. The author proposes a partly new classification of the Sphenisciformes based on behavior, ecological relationships and functional characteristics as well as morphology. During August and September, Gentoo Penguins make a partial migration to the breeding colonies and begin bowing and crowing. As the snow disappears the display is confined to the nest site. Much of the early display is incomplete or abnormal; the rôle of the sexes approximates to that which is later followed by the male alone and is interchangeable. Experiments with stuffed birds show that "behaviour is the only guide which penguins have in selecting a mate of the right sex." "The essential difference in the behaviour of the sexes is that during the breeding season a male tries to dominate weaker birds, while the female loses this dominating urge during the short period when fertilization must take place." Five distinct types of display utilize various highly developed allesthetic characters. Fighting occurs between birds of the same and of different sexes, and is the result of trespass on the territory (nest site) of another bird. Brooding begins before eggs are laid and continues if stones are substituted. A table of incubation periods shows that most species of penguins incubate for about forty days. The young collect in groups after hatching and receive food from any adult.

The latter section of the paper deals with an "attempted correlation of the behavior phases with gonadal development." The author examined microscopically the gonads of birds collected while performing definite phases of the reproductive cycle. This ambitious attempt is handicapped by the incomplete state of avian endocrinology and the omission of relevant literature. Most endocrinologists will agree that Dr. Roberts has overlooked two important principles. The first is that different behavior patterns (and somatic characters) respond at different thresholds

of hormone concentration (Domm, 1927; Carpenter, 1933). Since a small amount of interstitial tissue will produce sufficient hormone, the volume of the testis is not useful as a measure of behavior. The condition of the tubules is governed by gonadotropic hormones; behavior in turn is, with certain exceptions, controlled by androgens or estrogens. The condition of the testis reflects the effect of gonadotropins, not androgens. The second principle concerns the use of the term 'estrous.' In mammals the divisions of the estrous cycle depend upon the follicle-stimulating hormone and the luteinizing hormone; hence these divisions should not be used for entirely different aspects of the avian reproductive cycle. The author modifies Howard's misguided usage somewhat but still implies that the mammalian and the avian phases are similar; it is thus not surprising that the author encountered great difficulties in using the terms. Students of bird behavior had best avoid entirely the words 'proestrous,' 'estrous' and 'anestrous.' Some less-important points merit attention, as when (on p. 23) the author confuses the stimulus to ovulation with the mechanism of ovulation. Further, he overlooks the probability that some birds ovulate spontaneously. Fortunately the author's "tentative analysis" is based on a mass of solid data which will long outlive the ephemeral interpretations of author and reviewer.—DAVID E. DAVIS.

Harris on the California Condor.—In this important paper¹ the author brings together the results of an exhaustive search for historical data concerning the California Condor, as a preliminary to the hoped-for publication of a modern life-history study now in progress by others. Although no mention of the species occurs in accounts of early visitors to our southwest coast prior to 1600, there is a brief notice of the bird in the diary of the Carmelite father, Fr. Antonius de la Ascension, who in 1602, observed from shipboard a crowd of these condors feeding on the stranded carcass of a dead whale in Monterey Bay. A page of the diary (in early Spanish) containing this first account is reproduced in Mr. Harris's article. Not until 1769 was it again noticed by the Spanish. The first specimen of the bird to reach Europe is believed to have been one mentioned by Martinez in 1791 or 1792, but it was soon lost sight of, or destroyed. In the latter year, however, the botanist and collector, Menzies, accompanying Vancouver's expedition, secured a specimen at Monterey that later served as the type of the species, and is still preserved in the British Museum collection. This specimen was originally mounted and on exhibition, but afterward was taken down to be made into a study skin. A photograph of it, showing its present state, accompanies Harris's paper. The bird was first formally described and named by Shaw in his 'Miscellany' in 1797, but since the bill of the type was broken the characters could not be completely made out.

The first good account of the bird in the field was that of Captain Meriwether Lewis of the famous Lewis and Clark expedition. Further interesting details of early specimens to reach European collections are given, as well as an account of some of the first figures, and details of observations quoted from the journals of Lewis, Douglas, Lichtenstein, and many others. Thus the knowledge of this magnificent bird slowly grew. In 1859 the first figure of the downy young was published from W. M. Ord's original drawing. The further history of discoveries with accounts of habits, is given in full, bringing the subject down to the close of the nineteenth century, when already it had become evident that the bird was approaching the verge of extinction. This important paper is a splendid con-

¹ Harris, Harry. 'The annals of *Gymnogyps* to 1900'. *Condor*, 43: 3-55, 22 figs., Jan. 15, 1941.

tribution to the literary history of this great condor and well summarizes our limited knowledge of its past. A reproduction in color of the spirited painting of the bird by Fuertes forms a fitting frontispiece.—G. M. ALLEN.

PERIODICAL LITERATURE

- ABBOTT, ROY L. This Robin of mine. *Nat. History* (New York), **47**: 227-230, Apl. 1941.—Habits of a Robin with white feathers in its tail, that returned for five years to the writer's yard in Iowa.
- ALCORN, J. R. New and additional Nevada bird records. *Condor*, **43**: 118-119, Mar. 15, 1941.
- ALEXANDER, W. B. The index of heron population, 1940. *British Birds*, **34**: 189-194, Feb. 1, 1941.—The populations show a considerable decrease in comparison with the previous year in the British Isles, as a result probably of the very hard winter of 1939-40.
- ANDERSON, HARRY G. Spring arrivals in February and March for Dane County and vicinity [Wisconsin]. *Passenger Pigeon* (Madison, Wisc.), **3**: 16-17, Feb. 1941.
- ANDERSON, HARRY G., JR. Permanent and winter bird residents of Dane County and vicinity [Wisconsin]. *Passenger Pigeon* (Madison, Wisc.), **3**: 6-7, 1941.
- ANDERSON, HARRY G., JR. Spring arrivals in April and May for Dane County and vicinity [Wisconsin]. *Passenger Pigeon* (Madison, Wisc.), **3**: 24-26, Mar. 1941.
- ANON. Prospecto biologico del Lago de Patzcuaro [Mexico]. *Anales del Inst. de Biol., Univ. Nac. de Mexico*, **11**: 487-491, 1940.—Nominal list.
- ARVEY, M. DALE. A new race of bush-tit from southeastern California. *Condor*, **43**: 74-75, Jan. 15, 1941.—Describes *Psaltiriparus minimus providentialis*, from Providence Mts.
- BANTA, A. M. Another avivorous angler or goosfish. *Science*, **93**: 158, Feb. 14, 1941.—Herring Gull found in the stomach of a goosfish thrown up on the beach near mouth of Narragansett Bay, Rhode Island.
- BARGER, N. R. December field notes [from Wisconsin]. *Passenger Pigeon* (Madison, Wisc.), **3**: 5-6, Jan. 1941.
- BARGER, N. R., ED. Christmas bird census 1940 [in Wisconsin]. *Passenger Pigeon* (Madison, Wisc.), **3**: 7-10, Jan. 1941.—Listing 75 species.
- BARGER, N. R. January field notes. *Passenger Pigeon* (Madison, Wisc.), **3**: 18-20, Feb. 1941.
- BARGER, N. R. February field notes. *Passenger Pigeon* (Madison, Wisc.), **3**: 28-29, Mar. 1941.—In Wisconsin, a Snow Goose in late February with wintering Canada Geese; Glaucous Gull in Milwaukee; in La Crosse, no less than fifty Cardinals were banded in February; Purple Finches wintered plentifully.
- BARNES, V., JR., AND PHELPS, WM. H. Las aves de la peninsula de Paraguana. *Bol. Soc. Venezolana de Ciencias Nat.*, no. 46, 33 pp., map, 1940.—With a list of ninety species known from this peninsula.
- BARTELS, M., JR. Nogmaals: "De Avifauna van Batavia en omstreken." *Ardea*, **29**: 147-151, July 1940.—Additional notes to the list.
- BEAL, CLARENCE M. A bird sanctuary. *Bull. to Schools, Univ. State of New York*, **27**: 235-237, 4 figs., Mar. 1941.—The Kellogg Bird Sanctuary, Michigan.
- BELL, C. C. Unusual bird records for Kent County, Ontario. *Canadian Field-nat.*, **55**: 13, Feb. 8, 1941.
- BENSON, C. W. Further notes on Nyasaland birds (with particular reference to those of the Northern Province).—Part IV. *Ibis*, (14) **5**: 1-55, Jan. 1941.

- BERGMAN, GÖRAN, FABRICIUS, ERIC AND VON HAARTMAN, LARS. Eine vorläufige Untersuchung über die Nahrungsbiologie von *Larus f. fuscus* L. und *Larus a. argentatus* Pontopp., mit besonderer Berücksichtigung ihrer Bedeutung für die Pflege der jagdbaren Seevögel. *Ornis Fennica*, 17: 33-41, Nov. 1940.—Effect of gulls in destroying young of ducks does not justify killing them.
- BERNDT, RUDOLF. Vögel warnen vor fliegenden Fledermäusen. *Ornith. Monatsber.*, 48: 192-193, Dec. 14, 1940.—On two occasions, when a bat was startled from its hiding-place in a bird box, the small birds in the vicinity expressed alarm at the unusual sight.
- BIRCKHEAD, HUGH. On keeping oil-polluted ducks in captivity. *Avic. Mag.*, (5) 5: 24-27, Jan. 1941.—Good results obtained by placing the birds in a pen or hen-house, give them food in plenty to restore vitality, and provide pans of warm water. If the birds learn to eat the food provided, they will eventually succeed in cleaning off the oil by themselves.
- BIRD, C. G., AND BIRD, E. G. The birds of North-east Greenland. *Ibis*, (14) 5: 118-161, pls. 1-3, fig., Jan. 1941.—An important paper. First records of Starling (referred to the Shetland race) and Northern Willow Warbler; Snowy Owl abundant during the lemming years 1936, 1937; but in 1938 when lemmings were nearly absent not a Snowy Owl was seen. These owls also occasionally kill hares and rarely Rock Ptarmigan.
- BLAIR, R. H. Nest-sanitation. With additions from published sources by B. W. Tucker. *British Birds*, 34: 206-215, Mar. 1, 1941.
- BLAKE, EMMET R. Two new birds from British Guiana. *Zool. Ser. Field Mus. Nat. Hist.*, 24: 227-232, Mar. 15, 1941.—New races are: *Aulacorhynchus derbianus osgoodi* and *Piculus rubiginosus nigriceps*, both from Acary Mts.
- BOND, JAMES. On some birds from Grand Manan, New Brunswick. *Canadian Field-nat.*, 55: 34-35, Mar. 1941.—With additions to Pettingill's list of 1939.
- BOOSEY, EDWARD. Some war-time breeding results at Keston. *Avic. Mag.*, (5) 5: 301-305, Dec. 1941.—Avicultural notes on parrots.
- BRELSFORD, V. Field-notes on some Northern Rhodesian birds. *Ibis*, (14) 5: 161-172, Jan. 1941.
- BRIGHAM, EDWARD M., JR. Some sight records of the Blue Grosbeak in Michigan. Jack-pine Warbler, 19: 19-20, Mar. 1941.
- BRIMLEY, C. S. Prairie Horned Lark extends breeding range. *The Chat* (Raleigh, N. C.), 5: 22, Mar. 1941.—Two instances of nesting in Iredell County, North Carolina, in June 1940, and other recent sight records prove the extension of the breeding range now to this State.
- BRIMLEY, H. H. Wildfowl. *The Chat* (Raleigh, N. C.), 5: 5-7, Jan. 1941.
- BRINKMAN, WILHELM. Vom Zug- und Brutleben des Goldregenpfeifers im Emslande. *Ornith. Monatsber.*, 49: 12-15, Jan. 31, 1941.
- BROLEY, MYRTLE J. Banding eagles in Florida. *Amer. Forests*, 47: 70-72, 4 figs., Feb. 1941.—Of nestlings banded in Florida, two were subsequently shot in Virginia and one at Columbiaville, 100 miles north of New York City.
- BURLEIGH, THOMAS D. Occurrence of the Western Grasshopper Sparrow in Georgia. *The Oriole* (Atlanta, Ga.), 6: 11-12, Mar. 1941.—One taken at Newton, Jan. 27, 1936.
- BURLEIGH, THOMAS D. Further notes on the birds of Athens, Clarke County, Georgia. *The Oriole* (Atlanta, Ga.), 6: 5-7, Mar. 1941.
- BURK, WALTER L. Screech Owls bathing. *Iowa Bird Life*, 11: 12, Mar. 1941.—Two adult Screech Owls both in the red plumage raised four young of which two

- were red and two gray. All came frequently at dusk to drink and bathe at a bird bath.
- CALDWELL, JOHN C. Ruffed Grouse in Tennessee. *The Migrant* (Nashville, Tenn.), 12: 12-13, Mar. 1941.—Status of the bird in Tennessee; most common in the Cumberlands.
- CANADA, DEPT. MINES AND RESOURCES. Notes on Canadian bird-life. *Nature Notes* (Peoria, Ill.), 8: 39-42, Feb. 1941.—Ivory Gull on exhibition in the Quebec Zoological Garden.
- CARTWRIGHT, B. W. Solved—the mystery of Ross's Goose. *American Forests*, 47: 158-159, 204-205, 4 figs., Apl. 1941.—A further account of the discovery of the nesting grounds.
- CHANCE, EDGAR P. *The Cuckoo (Cuculus canorus)*. Privately printed, Surrey, Engl., 12 pp., Jan. 1939.
- CLARKE, C. H. D. Mourning Dove at Reliance, N. W. T. *Canadian Field-nat.*, 55: 12, Feb. 8, 1941.—A bird stayed from Sept. 13-Oct. 15 at this place, east end of Great Slave Lake.
- COLE, MINA P. Bird visitors at Red Deer, Alberta. *Canadian Field-nat.*, 55: 5, Feb. 8, 1941.
- COLE, R. K. *Listeria (Listerella)* infection in the fowl. *Poultry Science*, 20: 28-32, 2 figs., Jan. 1941.
- COOK, SALLY M. A rare visitor comes to our house. *Bull. Massachusetts Audubon Soc.*, 25: 48-49, Mar. 1941.—Northern Shrike in captivity.
- CREUTZ, GERHARD. Vom Zug des Grauen Fliegenschnäppers, *Muscicapa striata striata* (Pallas). *Der Vogelzug*, 12: 1-14, Jan. 1941.—Migration routes.
- CRUTTENDEN, JOHN R. A collecting trip to Churchill, Manitoba. *Öbologist*, 58: 2-6, fig., Jan. 1941.
- CUSHING, JOHN E., JR. Winter behavior of Ravens at Tomales Bay, California. *Condor*, 43: 103-107, text-fig. 28, Mar. 15, 1941.—A colony of some 200 birds dispersed over the surrounding forty miles of country but returned to a common roost at night.
- DAANJE, A. Heimfindeversuche und Erdmagnetismus. *Der Vogelzug*, 12: 15-17, Jan. 1941.—Review of Schein's work. Nearly fledged young Starlings were reared in a cage and the following year began to breed. After laying of first egg they were sent away but not one returned.
- DALE, E. M. S. Bird notes from London, Ontario. *Canadian Field-nat.*, 55: 1-4, Feb. 8, 1941.—First record of Snowy Egret for Ontario; a Scarlet Ibis at Point Pelee Sept. 13, perhaps to be correlated with one reported from Connecticut, week earlier; an Arkansas Flycatcher, Oct. 1, 1939.
- DAVIS, DAVID E. Notes on Cuban birds. *Wilson Bull.*, 53: 37-40, Mar. 1941.
- DEVITT, O. E. The Olive-sided Flycatcher nesting in the Toronto region. *Canadian Field-nat.*, 55: 46, Mar. 1941.
- DORRIEN-SMITH, ARTHUR A. Scarce birds in Scilly Isles. *British Birds*, 34: 181, Jan. 1, 1941.—Includes a record of Yellow-billed Cuckoo picked up dead at Tresco, November 6, 1940, another November instance.
- EDGE, ROSALIE, AND LUMLEY, ELLSWORTH D. Common hawks of North America. Introduction by Ira N. Gabrielson. Emergency Conservation Comm., publ. no. 81, 26 pp., figs., 1940.—A popular account, intended to spread information on the value of these birds to the public.
- ELLIOTT, CHARLES N. Is the Passenger Pigeon still alive? *Amer. Forests*, 47: 106-107, fig., Mar. 1941.—Reports of small numbers of these birds lately seen in Georgia are hardly to be taken seriously.

- EYLES, DON E. Status of the Gray Kingbird in Georgia. The Oriole (Atlanta, Ga.), 6: 1-5, fig., Mar. 1941.—"Rare, perhaps casual, summer resident."
- FELL, H. BARRACLOUGH. Animal behavior during air-raids. Science, 93: 61-62, Jan. 17, 1941.—Black-headed Gulls "displayed something akin to mass hysteria" when an anti-aircraft battery opened fire.
- FISHER, JAMES. The future of the Kite in Britain. Journ. Soc. Preservation Fauna of Empire, new ser., pt. 41: 13-16, Dec. 1940.—Believes the dwindling population due to inbreeding, and urges introduction of new stock from the continent of Europe.
- FORD, EDWARD R. Notable discoveries of birds' eggs. Chicago Naturalist, 4: 15-17, Mar. 1941.
- FOX, ADRIAN C. Winter feeding for game birds. State Game and Fish Dept., Bismark, No. Dakota, 16 pp., 1941.
- GABRIELSON, IRA N. America's greatest bird concentrations. Part II. Audubon Mag., 43: 15-23, figs., Jan.-Feb. 1941.—Seabird colonies in the Aleutian Islands.
- GAINER, ALBERT F. Through the seasons with the Cardinal. The Migrant (Nashville, Tenn.), 12: 1-4, Mar. 1941.—Habits and nesting in Tennessee.
- GARRISON, DAVID L. Massachusetts bird observers have record year. Bull. Massachusetts Audubon Soc., 43: 27-44, March 1941.—Review of 1940 Audubon check-lists.
- GLADKOW, N. A. Beitrag zum Studium der Vögel der Timan-Tundra. Journ. f. Ornith., 89: 124-156, 10 figs., Jan. 1941.—Many notes on birds found in summer between the Kanin Peninsula and the Petschora.
- GLENNY, FRED H. The main arteries in the region of the heart of three species of doves. Bull. Fan Mem. Inst. Biol., Peiping, zool. ser., 10: 271-278, Dec. 25, 1940.—In *Zenaidura* and two species of *Streptopelia*, "significant differences in the arrangement of the arteries" were recorded.
- GORMAN, F. The Cobalt Parrot (*Pionus cobaltinus*). Avic. Mag., (5) 5: 298-300, Dec. 1941.—With a supplementary note by E. Hopkinson.—A pair in captivity are in the Duke of Bedford's collection. Status probably subspecific.
- GRANT, C. H. B., AND MACKWORTH-PRAED, C. W. Notes on eastern African birds. Bull. British Ornith. Club, 61: 16-22, Dec. 20, 1940.—On resident races of Stonechat (*Saxicola torquata*); races of *Erythropygia leucophrys*; races of *Pogonocichla stellata* and of the Black Redstart.
- GREY, JOHN, JR., ED. The Christmas census [in North Carolina]. The Chat, 5: 8-12, Jan. 1941.
- GRISCOM, LUDLOW. The recovery of birds from disaster. Audubon Mag., 43: 191-196, Apl. 1941.—A brief review of recent instances of the decimation of certain species and their subsequent rapid recovery in numbers.
- GRISCOM, LUDLOW. The changing seasons. Audubon Mag., 43: 215-216, fig., Apl. 1941.—Autumn and winter birds in the East.
- GRISCOM, LUDLOW. Migration routes of New England birds. Bull. Massachusetts Audubon Soc., 25: 53-62, Apl. 1941.—A survey of migration routes and special deviations in this area.
- GRISCOM, LUDLOW, AND OTHERS. The season. CXXXVI. October 15, 1940, to February 1, 1941. Audubon Mag., 43: 222-236, Apl. 1941.—Reports from various sections of the United States on local bird life.
- GROSS, MARGARET. Maine's coastal and oceanic birds. Jack-pine Warbler, 19: 14-17, Mar. 1941.
- HACHISUKA, THE MARQUESS. The Black Kalij Pheasant (*Gennaeus moffiti* Hachisuka). Avic. Mag., (5) 6: 1-3, col. pl., Jan. 1941.

- HARRISON, JAMES M. Continental Robin and Ravens in Worcestershire. *British Birds*, 34: 178-179, Jan. 1, 1941.
- HAYWARD, C. LYNN. Notes on the nesting habits of some mountain dwelling birds of Utah. *Great Basin Naturalist* (Provo, Utah), 2: 1-8, pl. 1, Feb. 20, 1941.
- HENNESSY, T. S. Black-crowned Night Heron colony. *Canadian Field-nat.*, 55: 12, Feb. 8, 1941.—On an island in North River, Quebec.
- HILL, EDWARD A. The snow geese come to Parramore. *Audubon Mag.*, 43: 47-48, fig., Jan.-Feb. 1941.
- HILL, HAROLD M. Waterfowl breeding records from San Bernardino and Riverside Counties, California. *Condor*, 43: 71-72, Jan. 1941.
- HOLMES, J. S. Birds that hunt and are hunted. *The Chat* (Raleigh, N. C.), 5: 1-4, Jan. 1941.—Value of predatory animals.
- HOPKINSON, E. Breeding records to date. *Avic. Mag.*, (5) 5: 9-15, Jan. 1941.—Parrots bred in captivity.
- HOWELL, JOSEPH C. Bald Eagle killed by lightning while incubating its eggs. *Wilson Bull.*, 53: 42-43, fig., Mar. 1941.
- HUFF, R. English Sparrow nests. *The Flicker* (Minneapolis), 13: 11, Mar. 1941.—Notes on material used in construction.
- HULBERT, L. CLAIRE. Winter bird visitors from northern regions. *Jack-pine Warbler*, 19: 9-10, Mar. 1941.—Rough-legged Hawks and Snow Buntings.
- HUNTER, J. S., AND FRY, DONALD H., JR. Trends in California's game kill. *California Fish and Game*, 27: 13-28, Jan. 1941.
- JAQUES, FLORENCE PAGE. Blue Geese in April. *Nat. History* (New York), 47: 186-192, Apl. 1941.—With illustrations by Francis Lee Jaques. Field experiences.
- JONES, DAVID SMITH. Further studies on the origin of sympathetic ganglia in the chick embryo. *Anat. Record*, 79: 7-11, 2 pls., Jan. 25, 1941.—Cells which differentiate into sympathetic ganglia are derived from the ventral portion of the neural tube.
- KADNER, CARL G. Pigeon malaria in California. *Science*, 93: 281, Mar. 21, 1941.—This disease is for the first time reported positively from California. It is caused by a blood parasite, *Haemoproteus columbae*, and can be transmitted from bird to bird only by a blood-sucking bird-fly, *Pseudolynchia canariensis*. This fly was introduced into the United States about 1896 and is now found throughout the southern part of the country. Vigorous control measures are necessary.
- KALELA, OLAVI. Zur Frage der neuzeitlichen Anreicherung der Brutvogelfauna in Fennoskandien mit besonderer Berücksichtigung der Austrocknung in den früheren Wohngebieten der Arten. *Ornis Fennica*, 17: 41-59, Nov. 1940.—Relation of distribution to drought.
- KENDALL, J. B. The Whistling Swans on Green Bay [Wisconsin]. *Passenger Pigeon* (Madison, Wisc.), 3: 11-13, Mar. 1941.—In migration, swans "have always stopped in the vicinity of the southern end of Green Bay in varying numbers."
- KLEINSCHMIDT, O. Bemerkungen über *Emberiza aureola*. *Journ. f. Ornith.*, 89: 157-158, Jan. 1941.
- KOOIMAN, J. G. Mededeelingen over het voorkomen in Oost-Java van enkele voor dit gewest nog niet in de literatuur genoemde vogels. *Ardea*, 29: 98-108, July 1908.—Notes on birds of eastern Java.
- KRAAK, W. K., RINKEL, G. L., AND HOOGERHEIDE, J. Oecologische bewirking van de Europese ringgegevens van de Kievit (*Vanellus vanellus* (L.)). *Ardea*, 29: 151-175, July 1940.—A study of banding results shows that Ireland and the Spanish peninsula are the chief wintering grounds of the Lapwing. First-year

- birds may occasionally breed. Annual mortality is 40 per cent. At the beginning of the breeding season the population consists of 40 per cent of first-year birds, 24 per cent of two-year birds, 14 per cent of three-year birds, etc. (multiplying the number for each year by 9.6).
- LACK, DAVID. Notes on territory, fighting and display in the Chaffinch. *British Birds*, 34: 216-219, Mar. 1, 1941.
- LAMOREUX, W. F. Spermatozoal antibodies and infertility in the fowl. *Journ. Exper. Zool.*, 85: 419-430, Dec. 1940.
- LA RIVERS, IRA. The Mormon cricket as food for birds. *Condor*, 43: 65-69, Jan. 15, 1941.
- LATHAM, ROY. Herring Gulls as vegetable eaters on Long Island, N. Y. *Oölogist*, 58: 12, Jan. 1941.
- LAZELLE, JOHN H. Banded Starling record for Tyvan, Saskatchewan. *Canadian Field-nat.*, 55: 46, Mar. 1941.—Banded in North Dakota.
- LEACH, E. P. Recovery of marked birds. *British Birds*, 34: 172-177, Jan. 1, 1941.—List of recent recoveries in British Isles. A swift, *Apus apus*, recovered after seven years, was banded as a nestling; several cases of Sandwich Tern banded in British Isles recovered following April in Angola and Senegal.
- LEIVO, OLAVI. Beobachtungen über den Teichrohrsänger in der Gegend von Helsinki in den Sommern 1938-39. *Ornis Fennica*, 17: 66-70, Nov. 1940.—*Acrocephalus scirpaceus* habits.
- LENDON, ALAN. The Australian grass-parakeets (genus *Neophema*). *Avic. Mag.*, (5) 5: 294-298, Dec. 1940.
- LEWIS, HARRISON F. Occurrence of the American Egret at St. Charles de Bellechasse, Quebec. *Canadian Field-nat.*, 55: 12, Feb. 8, 1941.
- LEWIS, HARRISON F. Ring-billed Gulls of the Atlantic coast. *Wilson Bull.*, 53: 22-30, fig., Mar. 1931.—Six nesting groups are known, all north of the St. Lawrence.
- LEWIS, MARY F. W. Accent on May. *Audubon Mag.*, 43: 169-178, figs., Apl. 1941.—Migration of birds.
- LOCKLEY, R. M. The sea bird as an individual. Results of ringing experiments. *Smithsonian Rept. for 1939*, pp. 341-353, 1940.—A reprint of studies made at Skokholm.
- LORD, MRS. WILLIAM A. Red-breasted Nuthatches observed. *Bull. Massachusetts Audubon Soc.*, 25: 14, Feb. 1941.—Notes from New Hampshire.
- MANWELL, REGINALD D. Homing instinct of the Red-winged Blackbird. *Bull. to Schools, Univ. State of New York*, 27: 232-234, Mar. 1941.
- MARTIN, H. C. A double nest of the "Hornero", South American Oven-bird. *Avic. Mag.*, (5) 5: 16-20, pl., Jan. 1941.
- MASON, EDWIN A. Wildlife needs food strips. *Bull. Massachusetts Audubon Soc.*, 25: 67-70, Apr. 1941.—Suggestions for plantings.
- McILHENNY, E. A. Unusual plumage of domestic Mallard Ducks. *Journ. Heredity*, 32: 19-21, fig. 8, Jan. 1941.—White, melanistic and normal down pattern are shown.
- McKENNY, MARGARET. Invitation to the feast. *Bull. to Schools, Univ. State of New York*, 27: 222-224, 2 figs., Mar. 1941.—On "building up an environment" to attract birds.
- McMILLAN, NEIL T. Birds and the wind. *Smithsonian Rept. for 1939*, pp. 355-363, 3 pls., 1940.—Deductions based on airplane experience.
- McWILLIAM, J. M. On the relation of the Short-eared Owl to the common vole. *British Birds*, 34: 203-204, Feb. 1, 1941.—Suggests a dependence of the owl upon

- Microtus*, resulting in large sets of owl's eggs in years of plenty and a reduced breeding potential in years of scarcity. The lack of authentic breeding records for this owl in Ireland may be correlated with the absence of voles there.
- MEADE, GORDON M. Are birds the doctors' helpers? Bull. to Schools, Univ. State of New York, 27: 246-247, Mar. 1941.—Use of birds as *materia medica* and in study or prevention of disease.
- MEINERTZHAGEN, R. August in Shetland. Ibis, (14) 5: 105-117, fig., Jan. 1941.
- MEYER, W. Kreuzung zwischen Ringeltaube und Hohltaube. Ornith. Monatsber., 49: 17-19, Jan. 31, 1941.
- MILLER, ALDEN H. The buccal food-carrying pouches of the Rosy Finch. Condor, 43: 72-73, fig., Jan. 15, 1941.—An adaptation for gathering food in larger amounts at a distance from nest.
- MILLER, ALDEN H. The significance of the molt centers among the secondary remiges in the Falconiformes. Condor, 43: 113-115, text-fig. 29, Mar. 15, 1941.—In the secondaries two molt centers, an inner and an outer, are demonstrated, which meet at the diastataxic break.
- MILLER, ALDEN H., AND PRABODY, FRANK E. An additional Pleistocene occurrence of the Murre, *Uria aalge*. Condor, 43: 78, Jan. 15, 1941.—At northwestern San Mateo Co., California.
- MILLER, EDWIN V. Behavior of the Bewick Wren. Condor, 43: 81-99, text-figs. 25-27, Mar. 15, 1941.
- MILLER, RICHARD F. Pennsylvania and New Jersey [nesting] dates for 1940. Oölogist, 58: 6-8, Jan. 1941.
- MOFFITT, JAMES. Tenth annual Black Brant census in California. California Fish and Game, 26: 381-389, Oct. 1940.—A total of over 75,000 birds is the second largest of nine consecutive annual counts; the largest count is at Humboldt Bay.
- MONSON, GALE, AND PHILLIPS, ALLAN R. Bird records from southern and western Arizona. Condor, 43: 108-112, Mar. 15, 1941.
- MOORE, A. W. Wild animal damage to seed and seedlings on cut-over Douglas fir lands of Oregon and Washington. Tech. Bull., U. S. Dept. Agric., no. 706, 28 pp., June 1940.—The small amount of seed eaten by certain finches is probably negligible.
- MOORE, ROBERT T. New races of flycatcher, warbler and wrens from Mexico. Proc. Biol. Soc. Washington, 54: 35-42, Mar. 21, 1941.—The following are here named: *Megarhynchus pitangua tadiusculus* from near Rosario, Sinaloa; *Vermivora superciliosa sodalis* from southwestern Chihuahua; *Cistothorus platensis tinnulus* from western Michoacan; *Salpinctes obsoletus sollicitus* from Chiapas.
- MOREAU, R. E. "Duetting" in birds. Ibis, (14) 5: 176-177, Jan. 1941.—In various African bush-shrikes, in *Heterotrogon* and in *Bradypterus*.
- MUNN, P. W. Further notes on the birds of the Balearic Islands. Ibis, (14) 5: 174-175, Jan. 1941.
- NEFF, JOHNSON A. Arboreal nests of the Gambel Quail in Arizona. Condor, 43: 117-118, text-figs. 31-32, Mar. 15, 1941.
- NICE, MARGARET MORSE. Observations on the behavior of a young Cedar Waxwing. Condor, 43: 58-64, Jan. 15, 1941.—The rapid and incomplete digestion of fruit indicates its importance as a fruit-seed disseminator.
- NORD, W. H., AND BRECKENRIDGE, W. J. Record flight of Sandhill Cranes. The Flicker (Minneapolis), 13: 2-4, March 1941.—Some 300 birds at Moorhead, Minnesota.
- ORR, ROBERT T. Some observations on autumnal behavior of the California Pine Grosbeak. Condor, 43: 56-57, Jan. 15, 1941.

- PALMGREN, PONTUS. Oekologische Probleme der Ornithologie. Journ. f. Ornith., 89: 103-123, Jan. 1941.
- PATTERSON, BRYAN. Museum restores giant fossil bird that terrorized larger mammals. Field Museum News, 12 (no. 3): 1-2, 2 figs., Mar. 1941.—A restoration of *Mesembriornis*, a carnivorous Pliocene bird found in Catamarca, Argentina. Standing five feet high, it was related to the living *Cariama*, and was "one of the most spectacular of all birds either living or extinct."
- PRETZMEIER, J. Ueber Winterplatztreue und Winterortstreue der Waldohreule (*Asio o. otus* L.). Der Vogelzug, 12: 17-19, Jan. 1941.—From mid-November to end of March a group of 20 to 25 of these owls stayed daily in the same wood and a similar group did the same in the following year.
- PETERS, HAROLD S. Adventuring with waterfowl along the Atlantic flyway. Bull. Massachusetts Audubon Soc., 25: 3-6, 2 figs., Feb. 1941.—An interesting increase in breeding ducks in eastern Canada is reported.
- PETERSON, ROGER T. Bird migration. Part II. Audubon Mag., 43: 49-58, figs., Jan.-Feb. 1941.
- PETERSON, ROGER T. How many birds are there? Audubon Mag., 43: 179-187, figs., Apl. 1941.—Based on 'sample-plot' methods, the number of breeding birds in the United States is estimated at "not less than" five billion.
- PHELPS, WILLIAM H., AND GILLIARD, E. THOMAS. Six new birds from the Perijá Mountains of Venezuela. Amer. Mus. Novitates, no. 1100, 8 pp., map, Dec. 31, 1940.—New races are: *Penelope argyrotis albicauda*, *Grallaria ruficapilla perijana*, *Dendrocolaptes certhia puncti-pectus*, *Sittasomus griseicapillus perijanus*, *Atlapetes torquatus perijanus*, *A. rufinucha nigrifrons*.
- PHILLIPS, W. W. A. Ornithological observations. Loris, a Journ. of Ceylon Wild Life, 2: 169-177, 3 figs., Dec. 1940.—Bird notes in Ceylon.
- PICKENS, A. L. A red figwort as the ideal nearctic bird-flower. Condor, 43: 100-102, Mar. 15, 1941.—List of flowers attractive to various birds.
- PIERCE, FRED J. A Night Heron colony in Buchanan County [Iowa]. Iowa Bird Life, 11: 12, Mar. 1941.
- PITELKA, FRANK A. Distribution of birds in relation to major biotic communities. Amer. Midland Nat., 25: 113-137, 11 text-figs., Jan. 1941.
- PORTER, SYDNEY. Breeding the Chinese Azure-winged Magpie (*Cyanopica cyana swinhoi*). Avic. Mag., (5) 5: 3-8, Jan. 1941.
- POUGH, RICHARD H. The Caspian Tern. With illustrations by Melvin T. Johansen. Nat. Hist. (New York), 47: 82-85, Feb. 1941.—Remarkable photographs of nesting Caspian Terns in California. Incubation period given as twenty days.
- PULVER, HARRIET. Bird feeding ideas. Nature Notes (Peoria, Ill.), 8: 7-8, fig., Jan. 1941.
- RAND, A. L. Results of the Archbold Expeditions. No. 32. New and interesting birds from New Guinea. Amer. Mus. Novitates, no. 1102, 15 pp., Feb. 17, 1941.—Twenty new subspecies are described, with notes on other forms.
- RAYFIELD, P. A. Notes on breeding of Black Redstarts in Kent. British Birds, 34: 186-188, Feb. 1, 1941.
- RINKEL, G. L. Waarnemingen over het gedrag van de Kievit (*Vanellus vanellus* (L.)) gedurende de broedtijd. Ardea, 29: 108-147, pls. 6, 7, 11 text-figs., July 1940.—A study of the courtship, territorial relations and breeding of the Lapwing. "As a male displays a copulation flight for nearly every female visiting his territory, the possibility of bigamy is created; bigamy is of common occurrence and even a case of trigamy has been observed by me."

- RIPLEY, S. DILLON. Notes on a collection of birds from Celebes. Occas. Papers Boston Soc. Nat. Hist., 8: 343-358, Mar. 2, 1941.—A list of 87 species or races, with brief notes. New races described are: *Leucolirion subgularis restrictus* and *Macropygia amboinensis atrata*.
- ROBIEN, PAUL. Brutstudien an pommerschen Vögeln. Ornith. Monatsber., 48: 185-187, Dec. 14, 1940.
- ROSENE, WALTER. Filming the elusive Bell's Vireo. Iowa Bird Life, 11: 2-5, fig., Mar. 1941.—Breeding in central Iowa.
- RYSGAARD, G. N. Observations of Canada Geese at the Kellogg Sanctuary. Jack-pine Warbler, 19: 11-12, Mar. 1941.
- SAUNDERS, W. E. Kirtland's Warbler (*Dendroica kirtlandi*). Canadian Field-nat., 55: 16, Feb. 1941.—A visit to its haunts in northern Michigan.
- SHAW, TSEN-HWANG. Note on fossil birds found in Locality 18. Palaeontologia Sinica (Geol. Surv. China), new ser. C, no. 9, p. 92, 1940.—Fragments of eight species representing genera or species still living are reported from pleistocene deposits near Peiping.
- SHORTT, T. M. Some additions to the bird-list from Lake St. Martin, Manitoba. Canadian Field-nat., 55: 12-13, Feb. 8, 1941.
- SIVONEN, LAURI. Die Wacholderdrossel (*Turdus pilaris* L.) als Gartenbeerschädling. Ornis Fennica, 17: 24-32, Nov. 1940.—Résumé of longer article in Finnish.
- SIMPSON, GEORGE GAYLORD. Introducing the story of animal art through the ages. Natural History, 47: 86-96, Feb. 1941.—With reproduction of various early figures of birds and mammals.
- SKUTCH, ALEXANDER F. Some aspects of Central American bird-life. Scient. Monthly, 51: 409-418, 500-511, 1940.—With many interesting generalizations.
- SMITH, STUART. Some notes on the Scottish Crested Tit. British Birds, 34: 166-171, 3 figs., Jan. 1, 1941.—Display and nesting of *Parus c. scoticus*.
- SNYDER, L. L. The birds of Prince Edward County, Ontario. Univ. of Toronto Studies, biol. ser., no. 48: 25-92, 1941.—An annotated list of species found in the county.
- STANFORD, J. K. The Vernay-Cutting Expedition to northern Burma.—Part II. With notes on the collection by Dr. Ernst Mayr. Ibis, (14) 5: 56-105, Jan. 1941.—Six new races are named.
- STANLEY, ALLAN J. Sexual dimorphism in the Cowbird, *Molothrus ater*. Wilson Bull., 53: 33-36, Mar. 1941.—Males 25 per cent heavier than females. Differences in the sexually dimorphic feather tracts are not under the control of hormones hence are "determined genetically."
- STIRRETT, GEORGE M. The Scarlet Ibis and other waders at Point Pelee National Park. Canadian Field-nat., 55: 13, Feb. 8, 1941.—For comment, see P. A. Taverner's note.
- STONER, DAYTON. American Egrets observed from a Hudson River steamer. Wilson Bull., 53: 41-42, Mar. 1941.
- STONER, DAYTON. Bird casualties on the highways. Bull. to Schools, Univ. State of New York, 27: 229-232, fig., Mar. 1941.
- STORER, JOHN H. White wings over Florida. Audubon Mag., 43: 40-46, figs., Jan.-Feb. 1941.—Egrets, Wood Ibises and other species.
- STRESEMANN, ERWIN. Die Vögel von Celebes. Teil III. Systematik und Biologie. Journ. f. Ornith., 89: 1-102, Jan. 1941.—With biological notes by Gerd Heinrich. Conclusion of this series of reports. Four genera are migrants from Australia.
- [STRESEMANN, ERWIN]. *Colymbus adamsii* and *Cygnus bewickii* als Brutvögel bei Petsamo (Finnish Lapland). Ornith. Monatsber., 48: 188-189, Dec. 14, 1940.

- STRESEMANN, ERWIN. Die Erscheinungsdaten von J. L. Frisch's "Vorstellung der Vögel in Deutschland" (1733-1763). *Ornith. Monatsber.*, 49: 1-8, Jan. 31, 1941.—With a table showing dates of publication and extent of the parts.
- STRUTHERS, JAMES A. Pigeon Hawk recovered. *The Flicker* (Minneapolis), 13: 10, Mar. 1941.—Bird banded in the nest on Canadian side of Lake Saganaga, July 10, 1939, kept captive till its escape in August, and recovered at Houma, Louisiana, later in the autumn.
- SUTTON, GEORGE MIKSCH. Crousty, the story of a Redbird. *Audubon Mag.*, 43: 161-168, figs., Apl. 1941.—Development of nestlings.
- SUTTON, GEORGE MIKSCH, AND BURLEIGH, THOMAS D. Birds recorded in the State of Hidalgo, Mexico, by the Sempé Expedition of 1939. *Annals Carnegie Mus.*, 28: 169-186, Jan. 10, 1941.—Describe as a new race, *Arremonops rufivirgatus ridgwayi* from La Placita near Jacala.
- TANNER, DEAN. A submarginal population of Ruffed Grouse. *The Flicker* (Minneapolis), 13: 7-9, Mar. 1941.—In northern Minnesota, with notes on food.
- TANNER, JAMES TAYLOR. Three years with the Ivory-billed Woodpecker, America's rarest bird. *Audubon Mag.*, 43: 4-14, figs., Jan.-Feb. 1941.—General account of habits and habitat.
- T[AVERNER], P. A. The Scarlet Ibis and other puzzling records. *Canadian Field-nat.*, 55: 13-14, Feb. 8, 1941.
- TAVERNER, P. A. The nesting of Ross's Goose, *Chen rossii*. *Canadian Field-nat.*, 54: 127-130, Jan. 29, 1941.—A further account of the recent discovery of the nesting grounds of this and the Blue Goose in the Perry River region, with measurements of the eggs.
- THRONE, ALVIN L. A nesting study of the Eastern Hermit Thrush. *Passenger Pigeon* (Madison, Wisc.), 3: 13-16, Feb. 1941.—Incubation period twelve days; brooding up to the fifth day was by the female alone.
- THURBER, WALTER, AND BOWERS, R. E. Food of owls. *Bull. to Schools, Univ. State of New York*, 27: 243-245, 3 figs., Mar. 1941.—Pellet analysis of Great Horned Owl near Ithaca, New York.
- TICEHURST, CLAUD B. Systematic notes on Indian birds.—IX. *Ibis*, (14) 5: 177-182, Jan. 1941.
- TINBERGEN, L. Beobachtungen über die Arbeitsteilung des Turmfalken (*Falco tinnunculus* L.) während der Fortpflanzungszeit. *Ardea*, 29: 63-98, 18 text-figs., July 1940.—A detailed account of the breeding habits of the Kestrel, especially with reference to division of labor. The male feeds the female nearly up to the time the young fly.
- TÖRNE, HANS VON. Sandregenpfeifer trägt seine jungen fort. *Ornith. Monatsber.*, 49: 15-16, Jan. 31, 1941.—Transport of young *Charadrius hiaticula* by parent.
- TOMKINS, IVAN R. A Georgia specimen of the Iceland Gull. *The Migrant* (Atlanta, Ga.), 6: 11, Mar. 1941.—One taken near Savannah, Feb. 13, 1941.
- TRAYLOR, MELVIN A., JR. Birds from the Yucatan peninsula. *Zool. Ser. Field Mus. Nat. Hist.*, 24: 195-225, Feb. 28, 1941.—Seventeen forms are recorded from the peninsula for the first time, and a new form of tinamu, *Crypturellus cinnamomeus intermedius* is described from Pacaitun, Campeche.
- TRUMP, RICHARD F. Nesting of the Turkey Vulture in Van Buren County [Iowa]. *Iowa Bird Life*, 11: 15, Mar. 1941.
- TUCKER, B. W. American Pectoral Sandpiper in Northamptonshire. *British Birds*, 34: 182-183, Jan. 1, 1941.—In early September 1940, a good sight record.
- TUFTS, R. W. Some studies in bill measurements and body weights of American Woodcock (*Philohela minor*). *Canadian Field-nat.*, 54: 132-134, Jan. 29, 1941.—

- Females average longer-billed and heavier; body weight in both sexes increases during the open season Oct. 1 to Nov. 15.
- TUFTS, R. W., AND OTHERS. Christmas bird censuses, 1940. *Canadian Field-nat.*, **55**: 27-30, Feb. 1941.—Lists of birds seen in Nova Scotia, Quebec, Ontario, British Columbia.
- VÖLKER, OTTO. Zur Frage der Verbreitung der gelben Feder-Fluoreszenzen. *Ornith. Monatsber.*, **48**: 182-185, Dec. 14, 1940.—Fluorescence of feathers of certain parrots and galliform birds.
- WALKER, LEWIS AND MARIAN. Marsh Hawks: their trials and tribulations. *Audubon Mag.*, **43**: 35-39, figs., Jan.-Feb. 1941.—With excellent photographs of adults.
- WALKINSHAW, LAWRENCE H. The Prothonotary Warbler, a comparison of nesting conditions in Tennessee and Michigan. *Wilson Bull.*, **53**: 3-21, 2 figs. Mar. 1941.—With a longer breeding season the species is typically double-brooded in Tennessee but single-brooded in Michigan. Fledging success is about 25 per cent.
- WALLACE, GEORGE J. Winter studies of color-banded chickadees. *Bird-banding*, **12**: 49-67, Apl. 1941.
- WARNKE, GERHARD. Vom Schwalben-Frühjahrszug an der sizilianischen Küste. *Der Vogelzug*, **12**: 20-23, Jan. 1941.—Swallows pass in migration from Tunis to Sicily and Italy, with a reverse movement in fall.
- WARREN, D. C. A new type of polydactyly in the Fowl. *Journ. Heredity*, **32**: 3-5, pl., text-fig., Jan. 1941.—A type of duplication of toes in Leghorn Fowl, that "behaves genetically as an autosomal dominant."
- WHARRAM, S. V. Birds along the shore of Lake Erie. *Oölogist*, **58**: 11-12, Jan. 1941.
- WHISTLER, HUGH. East Himalayan Laughing-thrushes. *Ibis*, (14), **5**: 172-173, Jan. 1941.
- WHISTLER, HUGH. Differences of moult in closely allied forms. *Ibis*, (14) **5**: 173-174, Jan. 1941.
- WHITE, W. WALMESLEY. Bird of first brood of Swallow assisting to feed second brood. *British Birds*, **34**: 179, Jan. 1, 1941.
- WILLIAMSON, KENNETH. First brood of swallow assisting to feed second brood. *British Birds*, **34**: 221-222, Mar. 1, 1941.—In the case of *Hirundo rustica*.
- WITHERBY, H. F. Caspian Tern ringed in U. S. A. found in Yorkshire. *British Birds*, **34**: 184, Jan. 1, 1941.—Calls attention to the record by Lincoln in 'The Auk' for October 1940, and reiterates his conviction that the American and Palaearctic birds are not racially distinct.
- WOOD, A. A., STIRRETT, GEORGE M., AND ARNOTT, D. A. Observations on some interesting birds in Kent County, Ontario. *Canadian Field-nat.*, **55**: 15, Feb. 1941.
- WOOD, HAROLD B. Fractures [of bones] among birds. *Bird-banding*, **12**: 68-72, fig., Apl. 1941.
- YEALLAND, JOHN. Two interesting sea-birds. *Avic. Mag.*, (5) **6**: 20-22, Jan. 1941.—Sooty Tern and Guillemot in captivity.
- YEALLAND, JOHN. Some parrot-like birds at Sterrebeek. *Avic. Mag.*, (5) **5**: 288-293, Dec. 1940.—Notes on captive birds.
- YEALLAND, JOHN. The Blue Lories. *Avic. Mag.*, (5) **5**: 308-313, Dec. 1940.—Aviary notes on breeding and feeding.
- YEN, K. Y. Mitteilungen zur Avifauna von Yünnan. *Ornith. Monatsber.*, **49**: 9-11, Jan. 31, 1941.
- YOUNG, HOWARD, STOLLBERG, BRUCE, AND DEUSING, MURL. The spread of the Cardinal through Wisconsin. *Passenger Pigeon (Madison, Wisc.)*, **3**: 1-4, Jan. 1941.—Prior to 1900, *Richmondia cardinalis* was a rare straggler in Wisconsin.

Since then there have been at least five definite invasions, with nesting records for 25 counties.

ZIMMERMANN, RUD. Die Zwergmöwe, *Larus minutus* Pall., im Neusiedlersee-Gebiet. Ornith. Monatsber., 48: 173-178, Dec. 14, 1940.

ZIMMERMANN, RUD. Zum Vorkommen des Seggenrohrsängers, *Acrocephalus paludicola* (Vieill.), am Neusiedler See. Ornith. Monatsber., 48: 178-181, Dec. 14, 1940.

CONSERVATION NOTES

BY FRANCIS H. ALLEN

A 'Convention' embodying a preliminary agreement for 'the protection of Nature and the preservation of flora and fauna,' drawn up by a committee appointed by the Pan-American Union, was opened for signature at Washington, October 12, 1940, and has been signed by the United States and eighteen of the Latin-American Republics. One of its articles calls for the adoption of measures for 'the protection of migratory birds of economic or aesthetic value or to prevent the extinction of any given species.' It was ratified by the U. S. Senate, April 7, 1941.

IN his address before the Wildlife Conference in Memphis in February, Dr. Gabrielson warned his hearers to be on their guard against the danger of interference with conservation in the interest, real or imagined, of national defense. The Secretary of the Interior has appointed the Chief of the Division of the Pittman-Robertson Federal Aid Program, Albert M. Day, as a liaison officer to see that defense activities do not unwittingly interfere with wildlife.

THE Director of the National Audubon Society reports in the March-April number of the 'Audubon Magazine' (formerly 'Bird-Lore') that in Texas some Boy Scouts and their leaders have been found shooting protected birds. There is still work to be done for bird-protection in this admirable organization all over the country, though the work for merit badges in bird-study and conservation is doubtless producing good effects on the whole. Some State Audubon Societies are making profitable contacts with the Scouts.

WE learn from the same number of the 'Audubon Magazine' that certain technicalities as to rights in hypothetical oil deposits are likely to make an Everglades National Park an impossibility for the present but that the area may be made a Federal Wildlife Refuge instead.

FOUR very similar bills have been introduced into Congress providing for a Division of Water Pollution Control in the United States Public Health Service. They are H. R. 1110, introduced by Representative Spence of Kentucky; H. R. 3778, introduced by Representative Mundt of South Dakota, which is virtually the Barkley Bill of the last session with a modification of last year's Mundt amendment written into it; H. R. 4106, introduced by Weiss of Pennsylvania; and S. 1121, introduced by Senator Gillette of Iowa. The Mundt and Gillette bills are identical and are sponsored by the Izaak Walton League. Certain interests are opposing this important legislation.

WILDLIFE Leaflet 179 of the Fish and Wildlife Service, dated March, 1941, gives statistics on 267 Wildlife Refuges administered by the Service with an aggregate of 13,740,304 acres, of which nearly ten million are in the United States and the remainder in the Territories. The acreage ranges all the way from one acre for Purple Martins, gulls, and terns at Mille Lacs, Minnesota, to 2,899,685 in the Aleutian Islands, which harbor bears and caribou as well as countless multitudes of seabirds.

THE Report of the House Committee on Conservation of Wildlife Resources (January 2, 1941) recommends that permission be granted to hunters to include three Wood Ducks in the daily bag of ten ducks. This would put the Wood Ducks in the same category with the Redhead and the Canvas-back.

OBITUARIES

ALFRED WEBSTER ANTHONY

Plate 15

ONE of our great naturalists has passed on and left an enviable record of achievement. Alfred Webster Anthony was born in Cayuga County, New York, on December 25, 1865, and died at his home in San Diego, California, on May 14, 1939, at the age of 73 years. Few naturalists have seen more of the western United States and Mexico or done more to give us an accurate knowledge of the fauna and especially the birds and mammals of the West in its early days.

A mining engineer by profession and a naturalist by taste and interests, he could not resist the impulse to preserve and make known the rare and little-known birds and mammals around him and he added many new species of both to our knowledge, a goodly number of which were named in his honor. Important collections of birds and mammals bearing the labels of A. W. Anthony may be found in many of the leading museums of the country, especially the Carnegie Museum, U. S. National Museum, the American Museum of Natural History, and the San Diego Museum of Natural History, besides those scattered in private collections. His collections also included reptiles, invertebrates, plants and minerals and his interests leaned strongly toward the conservation of wildlife and a better knowledge of habits and values. He was preeminently a *field naturalist* but published many important papers on both birds and mammals.

Anthony's parents, when he was three years old, moved to the then infant city of Denver, Colorado, which was to be his home until early manhood. His school vacations were spent with his father, who was a mining man, amid scenes of beauty and interest to the young naturalist. This was the beginning of what was to be his real interest in life, although most of the time it had to be pursued as a hobby.

After schooling in Denver he took a course in mining engineering to follow in his father's footsteps. In the meantime he had visited an uncle living near Portland, Oregon, and there he began a serious study of birds, collecting and photographing them. At this time the Northwest was a relatively unknown region and he made many discoveries and became an authority on birds among the local Nature students. About this time he met Anabel Klink whom he married in 1888. Later a beautiful bluebird was named in her honor.

In 1886 the Anthony family moved from Denver to San Diego, and young Anthony engaged in mining in Lower California. Following this came a sojourn in New Mexico. In both of these regions he was studying birds as a hobby in all of his spare time. Ultimately his private collection, comprising some 10,000 birds, after long storage in several places, was sold to the Carnegie Museum at Pittsburgh.

While living at San Diego he felt the call of the sea and one of his first ventures was a trip of exploration to North Coronado Island, Mexico, about twenty-five miles from San Diego. The fishing boat which had been engaged to take him there failed to carry out the agreement but he secured a rowboat and rowed out alone, writing up the experience as 'A Night at Sea.' The family did not learn about the episode until they read about it later.

Anthony developed a keen interest in the islands off the coast of Lower California and purchased the schooner 'H. C. Wahlberg' in order to collect there.

With a company of young naturalists he carried on work which can truly be said to qualify him as a pioneer naturalist in this area. He made extensive collections of birds, their eggs, mammals, plants, reptiles, crustaceans and minerals, and many of these were distributed among various museums and private collectors.

With Charles H. Townsend he visited Guadalupe Island and the Benitos searching for elephant seal and Townsend's fur seal, utilizing this opportunity to study the birds as well. While he was with his family in Portland, Oregon, the schooner was chartered to others and was wrecked. Later on he obtained another schooner, the 'Stella Erland', and again had the misfortune to lose his boat. This time he was aboard with a party of naturalists, and everything was lost on the rocky coast of Lower California.

He then spent three seasons mining in Nome, Alaska, beginning with the gold rush, and from there turned to mining in eastern Oregon. From mining he turned to ranching and spent ten years in eastern Oregon on a homestead. But in 1920 he returned to San Diego for a visit and was tendered the directorship of the San Diego Natural History Museum. He accepted this post and remained there for four years.

On April 2, 1924, he sailed for Guatemala where he was to spend some of the happiest and most interesting years of his career as a naturalist. For upwards of five years he observed, collected and photographed birds, mammals and reptiles, moving about with native porters and working out of a number of field stations. Guatemala, with its picturesque Indians, its varied topography and its beautiful scenery, made a deep impression upon him. The birds collected at this time served as a substantial part of the material upon which Ludlow Griscom based his report upon the birds of Guatemala.

Ironically, the region in which he found such great enjoyment also exposed him to tropical disease and when he returned to the United States, after a continuous residence of nearly five years, he brought back with him a malady from which he never fully recovered. The effect of this was to place him on the retired list for the remainder of his life, and from that time on his field trips were limited to short sojourns in southern waters with some of his Mexican scientist friends. His last years were passed near Balboa Park in San Diego for which he had a deep affection. He was a frequent visitor at the Natural History Museum and the Zoological Park.

He had the distinction of discovering many species new to science; some of these he named and described but more were named by other scientists. Of the new birds which he collected and named the first was a beautiful bluebird, named for his young wife, *Sialia mexicana anabelae*, in 1888. Then followed *Junco oreganus thurberi* in 1890, *Heleodytes brunneicapillus bryanti* in 1894, *Toxostoma cinereum mearnsi*, *Pipilo fuscus senicula*, *Passerella iliaca stephensi*, *Colaptes chrysoides brunnescens*, *Thryomanes bairdi leucophrys* in 1895, *Thryomanes bewicki cerroensis* in 1897, and *Dryobates villosus monticola* in 1898.

In 1895, Dr. E. A. Mearns described Anthony's Green Heron, *Butorides virescens anthonyi*, and long before that his name had been given to many newly discovered species and subspecies of mammals.

In 1887, Dr. C. Hart Merriam named as *Peromyscus eremicus anthonyi* a desert mouse collected by Anthony the previous year at Camp Apache near the Big Hatchet Mountains in southwestern New Mexico. In 1898, Dr. J. A. Allen named in his honor the Anthony woodrat, *Neotoma anthonyi*, from Todos Santos Island,



A. H. Anthony

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Lower California, and in 1893 the Anthony mole, from the higher part of the San Pedro Martir Mountains in Lower California. Dr. W. H. Osgood named Anthony's pocket mouse, *Perognathus anthonyi*, collected by Anthony on Cerros Island, Lower California, and Dr. E. A. Mearns in 1907 named the beautiful Anthony's gray squirrel, *Sciurus griseus anthonyi*, from the Laguna Mountains in southern California.

To these notable lists of new species were added an important crab, *Cancer anthonyi*, from southern and Lower California waters, and a conspicuous flowering plant, *Dudleya anthonyi*, from the Peninsula of Lower California.

A partial bibliography of his published papers shows the trend of his interests and extent of his scientific activities better than any words could do.

The Oregon Jay (*Perisoreus obscurus*). Ornith. and Oöl., 9: 69, 103, 1884.

Breeding habits of the Rufous Humming Bird (*Selasphorus rufus*). Ornith. and Oöl., 9: 91-93, 1884.

Cassin's Vireo (*Lanivireo solitarius cassini*). Ornith. and Oöl., 10: 47, 1885.

Albinos. Ornith. and Oöl., 10: 152, 1885.

The Oregon Snowbird (*Junco oreganus*). Ornith. and Oöl., 10: 133, 1885.

Field notes on the birds of Washington County, Oregon. Auk, 3: 161-172, 1886.

Winter plumage of *Leucosticte australis*. Auk, 4: 257, 1887.

New birds from Lower California, Mexico. Proc. California Acad. Sci., (2) 2: 73-82, 1889.

A new junco from California (*Junco hyemalis thurberi*). Zoe, 1: 238-239, 1890.

Notice of a supposed new vireo from Oregon. Zoe, 1: 307-308, 1890.

Secondary migration of birds. Zoe, 1: 379-381, 1891.

Oregon's imported songsters. Zoe, 2: 6-11, 1891.

Notes on the Cactus Wren. Zoe, 2: 133-134, 1891.

Birds of southwestern New Mexico. Auk, 9: 357-369, 1892.

Salpinctes obsoletus in Washington and Oregon. Auk, 10: 87, 1893.

Leconte's Thrasher (*Harporhynchus lecontei*) west of the Sierra Nevada. Zoe, 4: 223-224, 1893.

Birds of San Pedro Martir, Lower California. Zoe, 4: 232, 239-240, 1893.

A full-sized Condor. Nidiologist, 2: 15, 1894.

Self-destruction of doves. Nidiologist, 2: 25-26, 1894.

Albino towhees. Nidiologist, 2: 55-56, 1894.

Notes on the genus *Heleodytes* with a description of a new subspecies. Auk, 11: 210-214, 1894.

Oceanodroma townsendi off San Diego, California. Auk, 11: 321-322, 1894.

Icterus parisorum in western San Diego County, California. Auk, 11: 327-328, 1894.

Tar and feathers. Zoe, 4: 364-365, 1894.

Nests without eggs. Nidiologist, 2: 66-67, 1895.

Taxidermal notes. Nidiologist, 2: 93, 1895.

Nesting of the Ruby-crowned Kinglet in southern California. Nidiologist, 3: 16-17, 1895.

Notes from the Colorado Desert. Nidiologist, 3: 50-51, 1895.

A new species of *Thryothorus* from the Pacific Coast. Auk, 12: 51-52, 1895.

A new subspecies of *Harporhynchus* from Lower California. Auk, 12: 52-53, 1895.

The fulmars of southern California. Auk, 12: 100-109, 1895.

Description of a new *Pipilo* from southern and Lower California. Auk, 12: 109-112, 1895.

- Birds of San Fernando, Lower California. Auk, 12: 134-143, 1895.
 The Pacific Kittiwake at San Diego, California. Auk, 12: 177, 1895.
 An albino Ruby-crowned Kinglet. Auk, 12: 181, 1895.
Junco hyemalis shufeldti in Lower California. Auk, 12: 183, 1895.
 The status of *Heleodytes affinis*. Auk, 12: 280, 1895.
 Probable occurrence of *Creagrus furcata* off San Diego, California. Auk, 12: 291, 1895.
 New races of *Colaptes* and *Passerella* from the Pacific Coast. Auk, 12: 347-349, 1895.
Oceanodroma socorroensis off San Diego, Calif. Auk, 12: 387, 1895.
 The Scaled Partridge (*Callipepla squamata*) in Colorado. Auk, 12: 388, 1895.
 The St. Lucas Flycatcher in California. Auk, 12: 390, 1895.
 A new subspecies of the genus *Dryobates*. Auk, 13: 31-34, 1896.
Puffinus tenuirostris off San Diego, California. Auk, 13: 171-172, 1896.
Clangula hyemalis at San Diego, California. Auk, 13: 172, 1896.
 The Black-vented Shearwater (*Puffinus opisthomelas*). Auk, 13: 223-228, 1896.
 The Roadrunner as a rat-killer. Auk, 13: 257-258, 1896.
 Grebe notes. Nidologist, 3: 71-72, 1896.
 New birds from the islands and peninsula of Lower California. Auk, 14: 164-168, 1897.
 The nostrils of young cormorants. Auk, 14: 205, 1897.
 The Roadrunner as a destroyer of caterpillars. Auk, 14: 217, 1897.
 Habits of Anna's Hummingbird. Nidologist, 4: 31-33, 1897.
 Measurements corrected. Nidologist, 4: 59, 1897.
 Land birds at sea. Osprey, 1: 57-58, 1897.
 Two new birds from the Pacific coast of America. Auk, 15: 36-38, 1898.
 Four sea birds new to the fauna of North America. Auk, 15: 38-39, 1898.
 A new name for *Dryobates v. montanus*. Auk, 15: 54, 1898.
 Petrels of southern California. Auk, 15: 140-144, 1898.
 The Pacific Kittiwake (*Rissa tridactyla pollicaris*) in Lower California. Auk, 15: 267, 1898.
 Avifauna of the Revillagigedo Islands. Auk, 15: 311-318, 1898.
 Hybrid grouse. Auk, 16: 180-181, 1899.
 A night at sea. Bull. Cooper Ornith. Club, 1: 101-102, 1899.
 Notes on the genus *Micruria*. Auk, 17: 168-169, 1900.
 Nesting habits of the Pacific Coast species of the genus *Puffinus*. Auk, 17: 247-252, 1900.
 A night on land. Condor, 2: 28-29, 1900.
 Habits of the Gooney. Auk, 18: 189, 1901.
 Migration of Richardson's Grouse. Auk, 20: 24-27, 1903.
 Nesting of the Townsend Solitaire. Condor, 5: 10-12, 1903.
 Where does the Large-billed Sparrow spend the summer? Auk, 23: 149-152, 1906.
 Notes on some species from eastern Oregon. Auk, 28: 274-275, 1911.
 Eastern Oregon notes. Auk, 29: 252-254, 1912.
 The Wood Rat as a harvester. Journ. Mammal., 1: 140-141, 1920.
 Strange behavior of a Bullock's Oriole. Auk, 38: 277, 1921.
 A Loon (*Gavia immer*) caught on a fishing line. Auk, 38: 269, 1921.
 The English Sparrow and the motor vehicle. Auk, 38: 605-606, 1921.
 The elephant seal off Santa Cruz Island, California. Journ. Mammal., 2: 112-113, 1921.

- The California gray whale on the coast of southern California. *Journ. Mammal.*, 2: 174, 1921.
- The Old Squaw (*Harelda hyemalis*) at San Diego, Calif. *Auk*, 39: 104, 1922.
- Review of Thorburn's British Mammals. *Journ. Mammal.*, 3: 57-58, 1922.
- Expedition to Guadalupe Islands, Mexico, in 1922. *Proc. California Acad. Sci.*, (4) 14: 277-320, 1925.
- The Sharp-tailed Sandpiper in southern California. *Auk*, 39: 106, 1922.
- Expedition to the Guadalupe Islands, Mexico, in 1922. The birds and mammals. *Proc. California Acad. Sci.*, 14: 301-320, 1925.
- Predatory Brewer Blackbirds. *Condor*, 25: 106, 1923.
- Porphyrio edwardsi* on the Pacific Coast. *Condor*, 25: 109, 1923.
- Ants destructive to bird life. *Condor*, 25: 132-133, 1923.
- Observations on the young of the southern pocket gopher, near San Diego, California. *Journ. Mammal.*, 4: 126-127, 1923.
- In defense of the coyote. *California Fish and Game*, 9: 111-112, 1923.
- Periodical emigrations of mammals. *Journ. Mammal.*, 4: 60-61, 1923.
- The raided rookeries of Laysan, a belated echo. *Condor*, 26: 33-34, 1924.
- Notes on the present status of the northern elephant seal, *Mirounga angustirostris*. *Journ. Mammal.*, 5: 145-152, 1924.
- A record of the Red-breasted Goose in California. *Condor*, 31: 181-182, 1929.

A. W. Anthony was a Fellow of the American Ornithologists' Union, a charter member and later an Honorary Member of the American Society of Mammalogists, a member of the Western Conservation Committee, and one of the early Directors of the San Diego Museum of Natural History. His honors were many but best of all were his genial personality and warm friendships. I count it an honor to have known him personally.

He is survived by his wife and two sons, Charles A. Anthony of San Diego and H. E. Anthony, now Curator of the Department of Mammals in the American Museum of Natural History, and a naturalist of world-wide experience.—VERNON BAILEY.

HENRY ELIOT HOWARD, widely known as the expounder of the 'territory' theory in birds, died on December 26, 1940. He was born in 1873, the son of H. Howard, of Kidderminster, England, and received his schooling at Eton and at Mason's College, Birmingham. Having achieved success in business, he settled down on his estate, 'Clareland', overlooking the Severn River, near Stourport, Worcestershire. It was here that he carried on the meticulous observations of birds during the breeding season, that eventually led him to the recognition of the value of 'territory' in the life cycle. In addition to his magnificent volumes on 'The British Warblers' (1907-14), his most valuable works were probably 'Territory in Bird-life' (1929) and 'Introduction to the Study of Bird Behaviour' (1929) in which he sets forth the evidence for the territorial concept as well as other minute observations of available common birds. His careful analyses of avian behavior and activities bespeak the genius that he was. In recognition of his work he was elected in 1930, a Corresponding Fellow of the A. O. U. and eight years later was made an Honorary Fellow. For an appreciation of his services to ornithology, see an article by Percy R. Lowe in 'British Birds' (34: 195-197, Feb. 1941), from which the above particulars are in part taken.—G. M. ALLEN.

CLAUD BUCHANAN TICEHURST, since 1922 a Corresponding Fellow of the A. O. U., died on February 17, 1941, at Appledore, Kent, England, after a brief illness. He

was born January 8, 1881, at St. Leonards-on-Sea, the third son of August Rowland Ticehurst. After his graduation from St. John's College, Cambridge, he became a physician, serving in India with the army from 1917-20, and later retired to private practice. On the background of his professional career he built an international reputation as an ornithologist. His taste for natural history began with school days and was fostered by companionship with Michael Nicholl, and later by almost yearly trips to Norway for fishing and shooting with other members of his family. At Cambridge he came under the stimulating influence of Professor Alfred Newton, with whom he developed a warm friendship.

In 1902, appeared his first ornithological paper, on 'The Birds of East Finmark.' Three years later he published his first note on British birds, recording the occurrence of the Solitary Sandpiper in Sussex. In these years all spare time was occupied in the study especially of British birds, while through his war service in the East he already had a keen interest in Asiatic birds. His book on the 'Birds of Suffolk' is regarded as one of the best of the local avifaunas of the British Isles, while his monograph on the difficult genus *Phylloscopus* is an outstanding work. In 1931, he became editor of 'The Ibis', carrying it through the last ten years.

In the words of Hugh Whistler, from whose obituary account of him (*British Birds*, 34: 239-241, 1941) these details are gleaned, "he was that rare combination, a first-class field naturalist and collector, and an accurate and careful museum worker." His contribution to ornithology is an inspiring example of what may be accomplished in the intervals of a life otherwise professionally engaged. His extensive private collection he bequeathed to the British Museum.—G. M. ALLEN.

ALBERT RICH BRAND.—Young ornithologists in this land of promise should derive much inspiration from the life of Albert Brand. He was an average American boy, thrown on his own resources at the age of fifteen, and he was able, by his own efforts, to acquire sufficient wealth in the next twenty-four years to retire from business and devote the rest of his life to the study of birds.

Albert's father, Charles S. Brand, was the eldest child of an impecunious family. He therefore left school early, to help support the family, and learned the trade of lithography. He was always interested in intellectual pursuits, however, and when, at the age of thirty, he suffered a nervous breakdown, as a result of typhoid fever, he travelled abroad for his health and, upon return, lectured in the New York City public schools on his travels. At forty-one he left the lithography business to study law and was admitted to the bar at forty-five but, unfortunately, was soon forced to retire because of recurrent nervous trouble. This left the responsibility of supporting the family upon Albert's mother, Ottilia G. Kohlberg, the gifted daughter of Jacob Kohlberg. Jacob had emigrated to the United States from Westphalia, Germany, for political reasons, in 1848, and had joined the 'forty-niners' in the gold rush to California. Later he had moved to New York City. When it became obvious that Charles Brand, Sr., could no longer practice law or otherwise provide for his wife and the three children, his wife, Ottilia, without previous business experience, started a lingerie shop in the Winsor Arcade, New York City, which was successful almost from the start, owing to her magnetic personality, her originality, and her gay and courageous spirit.

Albert's interest in birds was undoubtedly awakened by his mother's love of Nature and was quickened by his early walks through the woods with her and his two sisters.

He was born in New York City, October 22, 1889, and went to Public School 89,

from which he was graduated with honors in 1902, winning medals in Civics and English. After two years in Morris High School he spent the next year and a half in the high-school department of City College.

Unable, for financial reasons, to continue his schooling, he entered the firm of E. D. Levinson & Co., Bond Brokers, in March 1909, as a 'runner.' When asked, in later years, why he entered the bond business, he would reply with a playful twinkle, "Because the lace merchant to whom I also had a letter of introduction was not in." Perhaps this was the lucky incident in the life of a successful man that helped to shape his career, but it does not, of course, explain how he advanced, in eleven short years, to become a member of the New York Stock Exchange at the age of twenty-five. This was due to his innate ability and industry; to his sincere, vigorous, open, and retentive mind, with its ever-practical 'slant'; to his contagious enthusiasm and his keen sense of humor; and to the courage, cheerfulness and integrity that marked his every act and decision.

In January 1915, after six years of service, he was made a member of the firm of E. D. Levinson & Co., and in October of that year represented the firm on the New York Stock Exchange as bond broker and arbitrageur. Four years later he became associated with E. H. Stern & Co., in the same capacity, and was admitted to partnership in this firm in 1922. Six years later he went into business for himself as arbitrageur on the Exchange, and so successfully did he operate that within four months, on October 4, 1928, when only thirty-nine years old, in good health and at the peak of his earning career, he decided to sell his seat on the Exchange, to retire from business and devote the rest of his life to intellectual pursuits. This major decision was undertaken with the same sincerity, courage, and foresight that characterized his entire life. Friends advised him not to make the break from business to academic life too abruptly and, therefore, to study economics at Columbia University. This he tried for a year, but it did not satisfy him. Consequently, in 1930, upon the advice of Dr. Frank M. Chapman, he entered Cornell University as a special student majoring in ornithology.

Entering college at the age of forty, after being out of school for twenty-six years, and competing with young, active minds, might have been difficult for some, but not for Albert Brand. He put into his work all the zest and enthusiasm of a freshman, but, in addition, brought to his classes a keen mind trained to quick, logical thinking and accustomed to intense concentration. With this superior equipment he acquired, in two years, the fundamentals of zoology and botany and outstripped his younger associates.

On May 18, 1916, Albert Brand married Ernestine Charlotte Isabel, of New York City, the charming daughter of Charles S. Isabel, of Lorraine, France, a diamond merchant of New York, and Belle Prager Isabel, of Parkersburg, West Virginia. The following year they moved to White Plains, New York, where they took an active part in the community life and were particularly interested in the Little Theatre Movement in Westchester County, through the 'Fireside Players,' a group of amateur actors, as well as in the Ethical Culture Society of New York City and the Community Church of White Plains. They retained their residence in White Plains until 1936, when Albert accepted the appointment as Research Associate in Ornithology at Cornell University and moved to Ithaca, New York, where, with a charming home on the Campus, he spent the rest of his years.

In February 1933, after completing his undergraduate studies at Cornell, he was appointed Associate in Ornithology at the American Museum of Natural History

in New York City. This was upon the recommendation of Frank M. Chapman, who saw in Albert Brand the unusual combination of scientist and layman that would be most valuable to the Museum in effecting a liaison between the Bird Department and the Education Department to the end that the bird exhibits could be more understandingly presented to the visitors in the Museum. For three years he put his characteristic zeal into this work, answering hundreds of letters and queries, giving lectures, and organizing the local bird exhibits for the betterment of public education. Gradually, however, his increasing preoccupation with the science of ornithology and his desire to make a real contribution in a little-worked field led him to devote more and more thought to a project in which he had become much interested, the recording of the songs of wild birds on film. This enterprise was conceived while he was a student at Cornell and having some difficulty in learning bird songs. His desire to conquer the problem and, at the same time, to provide a practical aid to ornithological study led him to enquire into the feasibility of making accurate records of bird songs and transcribing them to phonograph disks, where they would be available to all.

Anyone but Albert Brand would have been discouraged at the difficulties of obtaining these recordings at a time when sound-recording was far from perfect, but his contagious enthusiasm elicited the full cooperation of engineering colleagues, especially Professors W. C. Ballard and True McClean, in building experimental amplifiers and film-recorders better suited for catching the high frequencies of bird songs than any at that time available. After several failures and the expenditure of considerable sums, a fairly successful machine was finally elaborated in 1934. In this work his technical adviser and most helpful associate was Dr. Paul Kellogg, but it is surprising with what celerity one of Albert Brand's training could master an understanding of the complicated elements of sound-recording and transmission and put them to work in this new venture.

His business training and his unflinching habit of completing every project he started urged him on to the publication, in 1934, of thirty-five of the first songs recorded. They were presented in the form of two small phonograph disks included in the back of a small book entitled 'Songs of Wild Birds.' This book was followed in 1936 by another similar volume, 'More Songs of Wild Birds,' containing three disks and forty-five songs, both published by Thomas Nelson and Sons. There were many mechanical difficulties in the production of these records, with resultant imperfections, which recent improvements in the recorder and the record stock have practically eliminated, but the early records have served a very useful purpose, representing as they do the first of their kind. Curiously enough, each volume was followed by an English publication, under exactly the same titles, with accompanying records of the songs of British birds.

In 1937, Albert Brand learned of the work of the American Foundation for the Blind and their production of 'Talking Books' and, upon invitation, was pleased to cooperate by writing two books (phonograph records) with accompanying bird voices—a project which has been received with great acclaim by the unfortunate people who can no longer see birds.

In the beginning of the bird-song recording Albert Brand was extremely active himself, getting up every morning during the song season before daylight, so as to be ready for the birds at dawn, when they sing best and when the sounds of civilization interfere least with the recording. In later years, failing health prevented very active participation in the actual field work, and he gave more atten-

tion to the study, under the microscope, of the songs that he had recorded and to tests of the hearing range of captive birds. His interest in completing the project of recording the voices of all North American birds and improving the recording mechanism never abated, however, and he planned and financed various expeditions from the Laboratory of Ornithology at Cornell to many parts of the United States. It is unfortunate that he could not have lived to complete the project, for at the time of his death he had assembled film records of the voices of over 300 species. He, himself, had accompanied four of the shorter expeditions. Two trips were made to Florida in 1935 and 1937, the latter of which, with Professor Frank E. Lutz, of the American Museum of Natural History, was primarily to record the calls of insects. Another trip was made to Kent Island, Maine, in 1937, where, by means of short-wave radio (since the sound-truck could not be brought closer than the Island of Grand Manan, three miles distant), he succeeded in recording the voice of Leach's Petrel. Mr. Brand was assisted in these experiments by Dr. Alfred O. Gross, of Bowdoin College, as well as Dr. Paul Kellogg. He also accompanied the expedition to Wisconsin and Michigan, in 1937, to secure records of the voices of the Greater Prairie Chicken and the Kirtland's Warbler. It was a keen regret to him that he could not accompany further than Florida the expedition of 1935, which went in search of vanishing species and succeeded in recording the Ivory-billed Woodpecker in Louisiana and the Trumpeter Swan in Montana. When the most recent expedition journeyed to the Pacific Coast, in 1939, he had to be content to be represented by his son, Charles, for by this time he was confined to his bed save for an hour or two each day.

As early as 1935 he knew that he was ever in imminent danger, with a maximum of ten years to live. Still through it all he was unbelievably courageous and cheerful, seeming only to be stimulated to renewed activity in his cherished work.

In 1935, he was elected to full membership in the American Ornithologists' Union, an honor which he greatly appreciated and responded to by applying for Life Membership. In 1937, he was elected to Sigma Xi, in recognition of his scientific accomplishment. This was an unusual honor for one not holding an academic degree. He was also a member of the Explorers Club of New York City, of the American Museum of Natural History, the New York Zoological Society, the National Audubon Society, the American Association for the Advancement of Science, the New York Academy of Science, the Linnaean Society, the American Wildlife Institute, the Cooper Ornithological Club, the Wilson Ornithological Club, and the American Society of Mammalogists. Each of these organizations will miss his name on its roster, even though he did not attend all of the meetings with the same regularity that he did those of the American Ornithologists' Union.

In 1934, he attended the International Ornithological Congress, at Oxford, England, and in 1938, the Congress held at Rouen, France, and, although by this time his health was greatly impaired, he entered into the meetings with his usual interest and delivered papers and demonstrations of his work in bird sound. Here, as everywhere, he made a host of friends. His broad interests in foreign and domestic affairs, his knowledge of European history, his appreciation of music, his love of Nature, of hiking, horseback-riding, canoeing, all contributed to make Albert Brand a favorite wherever he went.

Albert was very fond of young people and never failed to gain their friendship. He instructed and amused his own children, John, Charles, and Alice, and took

them for adventurous trips in the woods on foot or on horseback and loved to travel with them. The Brands' summer home on Paradox Lake, in the Adirondacks, like their White Plains and Ithaca homes, was a hospitable meeting place for a wide circle of friends and youngsters of all ages. I am sure that I speak for all three communities when I say that Albert Brand was well beloved by all who knew him, and he was an inspiring example of magnificent fortitude when taken from the life he loved so well.

He died on March 28, 1940, at the early age of fifty, but during that short span of years he accomplished what might well be the envy of any two normal men, for he was brilliant in business and, in the profession of ornithology, he achieved distinction in research and rendered a distinct service to all persons interested in birds.—ARTHUR A. ALLEN.

ALBERT ASHLEY CROSS, since 1918 an Associate of the A. O. U., was born at Huntington, Massachusetts, on January 31, 1877, the son of Edmund H. and Alice (Rust) Cross, and died there on April 15, 1940. He was interested in natural history from childhood up, and became an egg collector at about twelve years of age. Always mainly interested in the nesting birds of his region, he slowly acquired the eggs of an even hundred species. The last was a Cowbird's egg, in the spring of 1939.

After graduation from Childs Business College of Springfield, he worked at a variety of occupations and finally became interested in pharmacy. He was registered in 1909 and followed the profession the rest of his life, running a drug-store, first with his father, later with his brother.

He was always an interested and keen observer of bird life. In 1917, his name was suggested to E. H. Forbush when the latter was selecting observers from all over New England, and from then on Mr. Cross reported monthly on bird migrations or occurrences in his region. After the death of Mr. Forbush, he reported faithfully to the writer or to Professor S. A. Eliot, Jr., of Northampton. He was very cautious about identification and reported only what he felt no doubts about.

A special study that interested him was the nesting of birds of prey. It was his custom to search the woods in the fall after the leaves had fallen to learn of nests that had been used the previous summer. In this way he usually could locate an active nesting site of a pair of hawks the following season. Undoubtedly his best find in this respect was a Goshawk's nest in North Chester, discovered by his friend Harry Woods and himself on April 19, 1931, situated fifty-one feet nine inches aloft in a sugar maple, close to Kinney Brook. This proved to be the second breeding place of the Goshawk discovered in Massachusetts, the first one having been found in the Harvard Forest at Petersham, May 20, 1922, and identified by John A. Farley. Duck Hawks in particular intrigued Mr. Cross. Year after year he kept watch of the nesting ledge on Mt. Tekoa, southeast of Huntington, ascertaining the number of eggs and the success in their hatching and maturing. He banded numbers of these and other immature hawks and from a number of them received returns. For instance, a Broad-wing nestling banded July 5, 1930, was trapped less than eight weeks later at Atkins, Michigan, about 800 miles to the west. Many of his records and contributions were used in 'Birds of Massachusetts and other New England States' by E. H. Forbush in 1925-29 and in 'Birds of the Connecticut Valley in Massachusetts' by Baggs and Eliot in 1937.

He is survived by two brothers—Edmund Rust of San Diego, California, retired; Joseph Putnam of Huntington, Massachusetts, druggist; and a sister, Florence, at home.—AARON C. BAGG.

Miss JESSIE EMMA KLOSEMAN, an Associate of the American Ornithologists' Union since 1909, died in Boston, October 25, 1940. She was born in Saugerties, New York, March 15, 1876, but for nearly forty years had resided in the former city. She was greatly interested in Nature and music and took an active part in the Boston Mycological Club and the Brookline Bird Club. She was also a member of the Massachusetts Horticultural Society, the Massachusetts Audubon Society, the Vermont Bird Club and the Boston Symphony Association.—FRANCES A. KLOSEMAN.

DR. GUSTAVE LANGELIER died suddenly, at the steering wheel of his automobile, on April 23, 1940. He and Madame Langelier were on their way home from collecting birds for the Provincial Museum of Quebec, where for some time he had served as curator of the Section of Ornithology.

Gustave, son of Chrysostome and Hedwige (Dugal) Langelier, was born October 8, 1873, in the city of Quebec. He attended school in his native Province of Quebec and completed the classical course in the Séminaire de Québec. Although his father and other relatives of the Langelier family had won distinction as jurists, Gustave's tastes led him from the professions and to a life devoted to the advancement of agriculture. He early acquired a large country estate at Cap Rouge, which he farmed on his own account until 1911, when his farm was purchased by the Dominion Government and converted into a Dominion Experimental Farm with Dr. Langelier retained as its superintendent. Here it was that Dr. Langelier regenerated and established as a pedigreed breed the Canadian horse. Likewise, it was he who did much to rehabilitate and improve a breed of cattle now known as the Canadian. He was retained as superintendent of the Cap Rouge Experimental Farm until 1933, when he retired to devote his time and thought wholly to ornithology. It was on April 23, 1918, that Laval University, in recognition of his distinguished service to agriculture, conferred upon him the title of Doctor in Agriculture. On September 5, 1923, the Government of the Province of Quebec awarded Dr. Langelier the diploma of Très Grand Mérite Agricole.

Dr. Langelier became actively interested in ornithology in 1920, but then only as an amateur. In 1923, he was made an Associate of the American Ornithologists' Union. By 1933, he had assembled an enviable collection of bird skins, and, with the able assistance of his wife, had catalogued each as to order, genus, and species. Shortly after his retirement from Cap Rouge he was employed by Laval University to place in order and on a scientific basis its ornithological collection. In 1938, he entered upon his duties as Curator of Ornithology in the Provincial Museum and served in that capacity until his death.

Dr. Langelier, a man of fine enthusiasm for and never-failing interest in birds, had built up a splendid private collection of skins and mounted specimens. Two thousand of these were purchased by McGill University (Montreal) and other thousands from the same collection are now the property of the Provincial Museum. He had made by the time of his death a third collection of more than 1,800 skins, almost all of which represented birds from Quebec.

Besides his daughter, Mme. J. A. Joli-Coeur, and eleven grandchildren, Dr. Langelier is survived by his wife, ever his efficient collaborator in ornithological research and his faithful, constant companion. In early August, 1940, she succeeded her deceased husband as Curator of Ornithology in the Museum of Quebec.

—HARRY B. HUMPHREY.

MERRIAM GARRETSON LEWIS, Associate since 1924 of the American Ornithologists' Union, died of a heart attack at his home in Mount Vernon Place, Salem, Virginia, on Sunday afternoon, January 5, 1941. He had had no premonition of this trouble. In fact, he had been on a bird walk on that very morning. Son of John B. and Ida Van Fossen Lewis, he was born at Eubank, Kentucky, June 22, 1893. His parents took him at the age of ten to Norfolk County, Virginia. He was educated at the Driver's District Agricultural High School in Nansemond County, Virginia; at Berea Academy, Kentucky; and at the University of Kentucky. Enlisting in the infantry in April 1917, he served for nineteen months at Camp Lee, Virginia, and was discharged in November 1918, as second lieutenant. Following his father's profession, he became Agricultural Agent in Scott County, Virginia. In 1920, he moved to Lexington, Virginia, where he filled the same position in Rockbridge County to 1932. On July 1, 1932, he moved to Salem, Virginia, to become Agricultural Agent in Roanoke County, a position which he held until his death. His funeral service was held on January 7 at the Salem Presbyterian Church, of which he was a member and in which he had taught a Sunday School class of boys. He was given a military burial at the Sherwood Burial Park by the Salem Post of the American Legion. Surviving him are his wife, Gertrude M. Button Lewis; a son, Markham, and two daughters, Dorothy and Florence; his parents; two brothers, and a sister.

Lewis led an active and useful life, interested in many forms of public service and belonging to many organizations. He was a member of various poultry, dairy, and horticultural associations, serving as one of the three members of the Virginia Apple Growers' Industrial Commission. He was chairman of the Salem Boy Scout Troop Committee, and was a member of the Grange, the American Legion, the Appalachian Trail Club, and the Virginia Wild Life Federation. His chief interest outside his own profession was ornithology. He belonged to the Wilson Ornithological Club and the Virginia Society of Ornithology, as well as to the American Ornithologists' Union. He was one of the founders of the Virginia Society of Ornithology, and served two terms as its president. For the past two years he had published 'The Raven' at his office in Salem. He rarely missed a meeting of the Virginia Society, and gave freely of his thought and his time to its interests. Much of his spare time he gave to field trips in the Virginia mountains. The throng of friends which gathered at his funeral included many of his ornithological associates.—J. J. MURRAY.

DR. GLADWYN KINGSLEY NOBLE, an Associate of the American Ornithologists' Union since 1938, died suddenly of heart trouble at New York, on December 9, 1940. Only forty-six years of age, he had seemed in the full vigor of achievement so that his death came as an unexpected termination of a career already bearing abundant fruit. I remember him well when he came as a freshman to Harvard, a tall, awkward young man with a beaming smile and an eager interest in birds, reptiles and amphibians. This interest led him to continue his work into post-graduate years at Harvard and later at Columbia University, leading in 1922 to the Ph.D. degree. Meanwhile he had made in his summer vacations three expeditions, one to collect birds in Newfoundland, another to Guadeloupe Island in the West Indies, and a third to the highlands of Peru. This and other field experience greatly added to his store of knowledge of living animals. He became lecturer in palaeontology at Columbia, visiting professor of biology at New York University and the University of Chicago. In 1919 he had become associated with

the American Museum of Natural History, where his versatility soon built up not only a splendid department of herpetology but also one of experimental biology, through which in rapid succession he put forth a series of valuable and original studies in animal behavior, particularly on social habits, that made him one of the foremost figures in this rather new field, wherein he endeavored to combine field studies with laboratory methods. Of special value in ornithology, are his researches on the mating and social behavior of the Flicker, the Black-crowned Night Heron and the Laughing Gull. Much of his work lay in the field of herpetology, and his book on 'The Biology of the Amphibia' and his investigations on the classification of this group are outstanding in importance. He was an energetic worker and an original thinker with a wide grasp of the problems of behavior. His loss will be keenly felt by many who looked to him for leadership and inspiration.

Dr. Noble was born at Yonkers, New York, September 20, 1894, the son of G. Clifford and Elizabeth (Adams) Noble, and in 1921 married Ruth Crosby of Hartford, Connecticut, who with their two sons, survives him.—G. M. ALLEN.

JAMES HENRY RICE, JR.—The passing of a pioneer is always momentous, particularly so in these almost pioneerless days. James Henry Rice, Jr. (as he invariably signed himself) was a pioneer in the field of bird protection in a region where the reaction at that time to this phase of conservation was more often ridicule than not. He lived to see ridicule displaced by concerted, sober effort, and throughout his life his interest in wildlife resources, as well as constant adherence to his native heath, never failed or faltered.

He was born July 2, 1868, on Riverlands Plantation, Ninety-six, South Carolina. He showed an early interest in natural history, particularly in birds, and through a literary life, he continued active field study and work in ornithology. Graduating from South Carolina College (now University of South Carolina) in 1887, he taught school until 1895. In 1892, he married Miss Jennie Maner of Allendale, South Carolina, and abandoned teaching for active writing and editing of daily newspapers, being editor of the 'Columbia (S. C.) State' in 1896. This was followed by the founding of weeklies and sportsmen's journals at Conway and Georgetown, which occupied him until early 1907. That year was something of a milestone, for in it he became definitely connected with national conservation through T. Gilbert Pearson.

Also a pioneer, Dr. Pearson had been working strenuously and with considerable success in North Carolina, and he had attempted to include South Carolina in the program. Efforts in 1905, however, had no results but in March 1907 he succeeded in obtaining the passage of "An Act to Incorporate the Audubon Society of South Carolina and Provide for the Preservation of the Wild Birds . . . of the State." The appointment of wardens and other officials was provided for in the Act, and when asked by the State authorities in Columbia for prospective officers, Dr. Pearson named Rice for Secretary.

For the following four years, Rice filled this post, supervising wardens, writing reports and articles, investigating conditions in the field, and doing all he could to arouse public sentiment in bird protection. These were the troublous years of the plume-hunter 'wars' and the crucial time for saving the American Egret and the Snowy Heron. Rice, often in the field amid the remaining Carolina rookeries, narrowly escaped death more than once, and on one occasion he and his warden in that locality engaged in a fight with plume-hunters in which the warden was shot through the leg.

The Audubon Society of South Carolina was also its Game Department in those days and Rice entered politics to the extent of being responsible for the creation of the post of Chief Game Warden, which he undertook. His tenure of office was of short duration, however, as an antagonistic group of sportsmen who backed another man, finally succeeded in ousting Rice and put their man in power. This was in late 1911.

Dr. Pearson who had meanwhile gone to New York as Executive Secretary of the National Association of Audubon Societies, again included Rice in the Association, giving him the post of Field Agent for South Carolina, in 1912. Throughout that year and the following one he served in such capacity, when connections between him and Dr. Pearson were dissolved permanently.

In 1910 he was elected an Associate of the American Ornithologists' Union. From 1914 through most of 1917, he was a representative of the U. S. Biological Survey as Inspector of Birds, and following that, ceased affiliation with organized conservation. From then on he lived at Brick House Plantation, Wiggins, South Carolina, and amid the live-oaks and cypresses of his beloved Low Country, turned to writing again. His 'Glories of the Carolina Coast' went through five editions and was followed by 'The Aftermath of Glory' and 'A History of Old Ninety-six'. Besides these books, he wrote hundreds of articles on birds, forestry and conservation subjects for newspapers, sportsmen's journals and historical publications.

His children, six sons and a daughter, were reared amid an atmosphere of quiet solidarity in the old plantation tradition and his admiration of his ornithological contemporaries is reflected by the fact that one of his sons bears the name of Robert Ridgway.

On occasions, he would come to Charleston and drop in at the Museum where the writer was then engaged, and his knowledge of local history, his remarks on conservation and science, made such visits memorable experiences. In his late years he was handicapped by deafness but was ever ready with anecdote and reminiscences. His death occurred March 24, 1935, the same month when, twenty-eight years before, he had entered into the organized and infant endeavor of bird protection.

His life has left its impress on the Carolina Low Country in the indelible stamps of conservationist, historian and gentleman.—ALEXANDER SPRUNT, JR.



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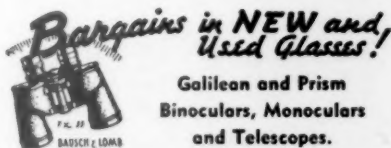
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